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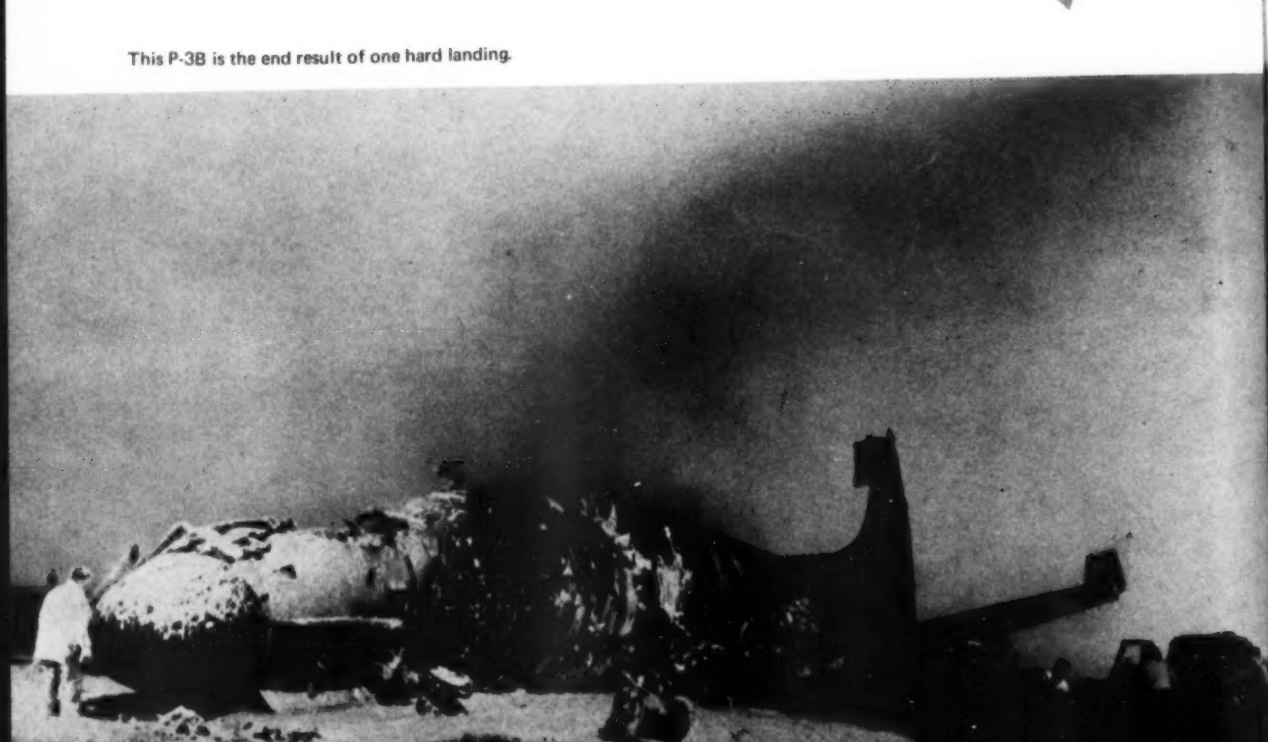
approach

AUGUST 1969 THE NAVAL AVIATION SAFETY REVIEW

FIELD
HARD

This P-3B is the end result of one hard landing.



LANDINGS

A review of FY 69 major hard landing accidents indicates that lack of effective supervision was a major factor.

DURING the first 10 months of FY-69, six major fixed-wing aircraft accidents have occurred during field landing operations which can be characterized as *hard landings*. Hard landing accidents are defined as those *caused by a high rate of descent at impact, settling into the deck or flying into the deck and porpoising.* FY-69 accidents include:

- P-3B – aircraft destroyed; five fatalities and one major injury.
- A-3B – aircraft received substantial damage; no injury.
- T-33B – aircraft received strike damage; no injury.
- TA-4F – aircraft received strike damage; one major and one minor injury.
- F-4J – aircraft received strike damage; no injury.
- A-4C – aircraft received strike damage; no injury.

The aircraft involved in these accidents range from trainers to patrol class to fighter class aircraft; therefore, it is obvious that hard landing accidents are possible in any type aircraft. What then are the lessons we can learn from these particular accidents?

All of these accidents occurred in fleet operating units and all the pilots involved were designated naval

aviators; however, they were relatively inexperienced in the model aircraft involved:

- In three of the accidents, the pilots involved were under instruction and were being given their initial checkout in model.
- In the fourth accident, the pilot had already checked out in model but had a total of only 49 hours of jet time when he launched on an extended cross-country flight during which the accident occurred.

In the other two accidents, one of the pilots had over 200 hours in model and over 600 hours total time. The effect of the experience factor in this accident, if any, is less apparent. The experience of the pilot involved in the sixth accident is unknown as the complete AAR is not available at this writing. Therefore, the details of that accident will not receive further comment.

The Supervision Factor

All of these accidents involved too high a sink rate at the moment of touchdown. This seeming lack of respect, on the part of the pilots involved, for fundamental laws of aerodynamics as they apply to particular aircraft can be attributed in part to their lack of experience in model aircraft. This lack of experience in model aircraft was known before the accidents, however; and it appears that a lack of appropriate, effective supervision was a major factor in most, if not all, of these accidents.

The details of the first three accidents are such as to suggest that *instructor pilots in the fleet may feel a certain unwarranted complacency about the students they are instructing simply because they are designated aviators.* Moreover, some commands may not fully appreciate the necessity of assigning only fully qualified instructors to supervise checkouts. These points are open to discussion but a more detailed look at these accidents will illustrate what we mean:

The P-3B Accident

A Dive for the Deck

The P-3B was on a local instrument training flight as part of the RAG syllabus. The plane commander was accompanied by two pilots under instruction. The aircraft took off for a round-robin flight with practice instrument approaches to be conducted at various fields enroute. After two practice ILS approaches at another field, the aircraft was vectored to the GCA pattern at home field. With one of the pilots under instruction in the left seat, the P-3B made one GCA to a touch-and-go landing. The aircraft was then cleared for a second GCA to a touch-and-go landing. The GCA was normal until reaching PAR minimums of 100 ft AGL and 1/2 mile from the GCA touchdown point (750 ft past the approach end). At about this time, the controller informed the pilot: "Now you're going above glide path; slightly above glide path – you're going further above; you're above glide path; above glide path. Over landing threshold and over touchdown."

Shortly thereafter the aircraft contacted the runway in a very high rate of descent. A witness on the ground (a naval aviator in another aircraft who was holding short of the high-speed taxiway) observed the approach. He later described it in these terms:

"I first saw him when he was on glide slope, coming downhill . . . . He looked a little high to me for the position he was in. I would guess he was high. I thought that it was about the time he should be leveling off for a low approach which is what I thought he was going to do; he seemed to be too high to make a landing near the end of the runway. He pushed the nose of the aircraft over and started coming downhill very fast; he had a high sink rate and it looked like he flared too late. He pulled the nose up but it didn't even slow the aircraft down – really coming downhill at that point. I knew that he was in trouble but thought that it would be just a hard landing. He really pulled the nose up. It was a pretty abrupt flare, not the real smooth transition that I've seen that type of aircraft make before. The nose-down pitch was smoother than the flare to me. I've seen them do this before – just kind of dive for the deck, push the nose over in close and then flare but it looked like he was a little slow to be doing this and he was late in starting the flare because it didn't appear the flare did anything to break his rate of descent. He was really coming down!"

The aircraft struck the runway in a nose-high attitude, slightly left wing down at a sink rate computed to have been 18-20 fps. The impact point was 240 ft past the runway threshold. At touchdown, or shortly thereafter, the port wing separated from the fuselage inboard of the landing gear and a fire developed in the vicinity of the No. 2 fuel cell. The fuselage slid down the runway and came to rest off the left side of the runway, engulfed in flames. The aircraft was totally destroyed (see photo inside front cover).

Precise Cause Undetermined

The precise cause of this accident could not be determined. Extensive investigation by the board failed to reveal any material failure or emergency situation, either real or imagined, which occurred prior to the accident which could have contributed to it.

It was the opinion of the board that the pilot (under instruction) who was still under simulated instrument conditions after reaching PAR minimums had leveled off; standard instructor procedure on an instrument approach calls for the pilot to remain on instruments until the copilot calls contact and informs the pilot of

the direction of the runway. GCA procedures call for the pilot to initiate missed approach procedures at PAR minimums if the runway is not in sight. It is believed that the copilot (instructor) did not call contact and the pilot under instruction commenced level-off at the DH (Decision Height) and instead of executing a missed approach, crossed the runway threshold at an altitude estimated to be 60-80 ft. At this point the pilot may have become confused as to whether he was supposed to initiate a missed approach or commence a landing. Once the decision to land was made it is probable that the pilot reduced power levers to FLIGHT IDLE and nosed the aircraft over at a dive angle estimated by eyewitnesses as from 12-35 degrees. At a point in the descent the aircraft was rotated to a nose-high attitude in an attempt to check the rate of descent. The nose-high attitude was attained prior to impact but was not effective in decreasing the sink rate of the aircraft. It was the opinion of the board that the pilot or copilot, or both, attempted to stop the sink rate with more attitude *but did not add power.*

The opinion advanced by the board as to the cause of this accident was discussed by the first endorser to the AAR. He stated in essence:

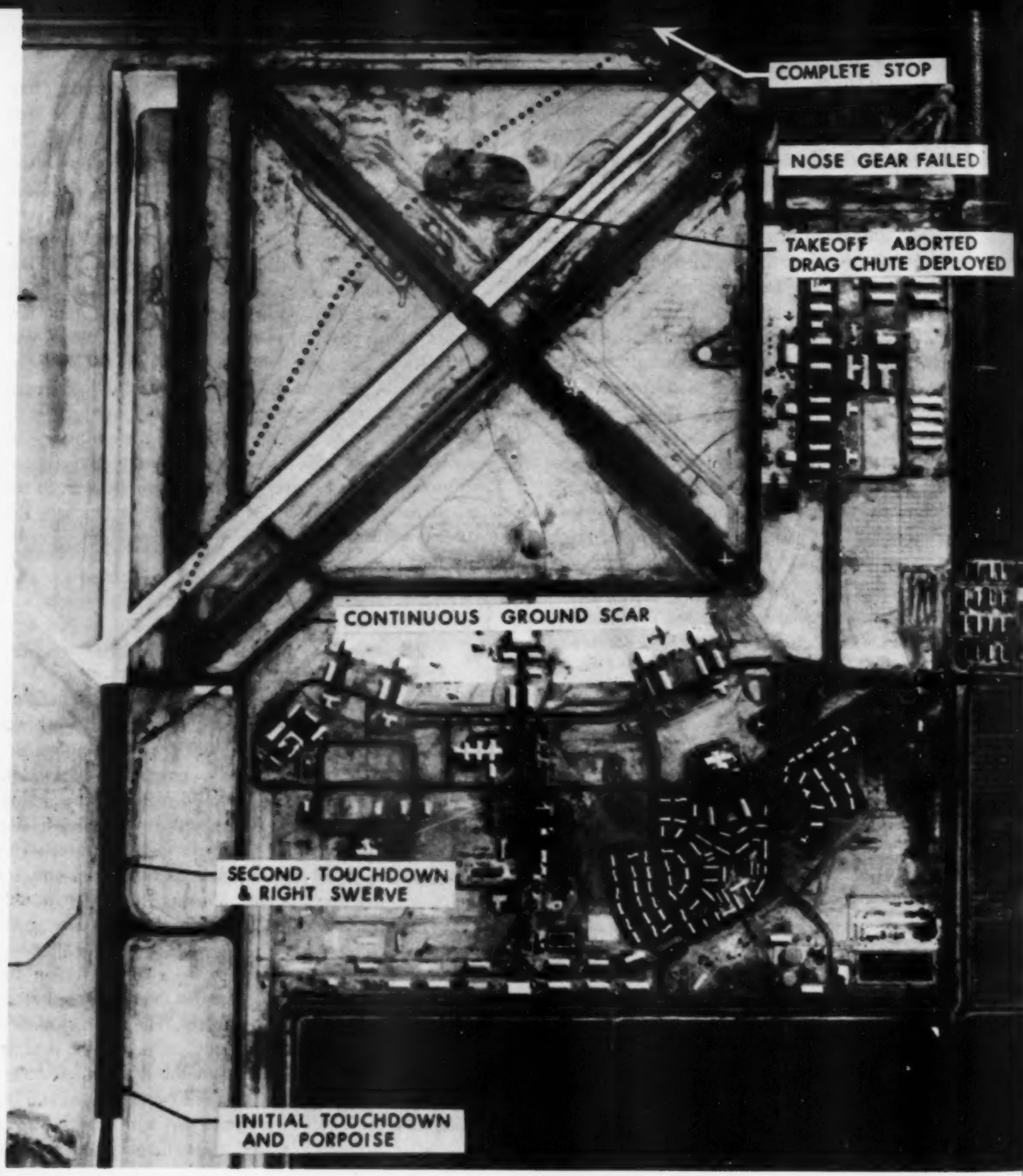
"The board concluded that the student pilot probably became confused as to whether he should wave off or land. This is certainly a possibility; however, the facts available are insufficient to accept this conclusion to the exclusion of other possibilities. The aircraft was observed to go above the glide slope after passing GCA minimums but it is doubtful that power was applied at that time and a waveoff was most probably not intended. The tendency to go above glide path during the transition from instrument flying to contact flying at minimums is a typical reaction from an inexperienced student. With no additional power applied, the airspeed can be expected to decrease by 10 kts in a matter of seconds. The normal recovery from this situation is to lower the nose to increase airspeed, withholding any power reduction until the flare is well in hand. In the case of this accident, the rapid sink rate was not observed until after the nose dropped, indicating, as the board concluded, that the pushover was accompanied by a simultaneous power reduction, probably to FLIGHT IDLE. In the less than two seconds available between the pushover and impact the instructor (copilot) failed to apply power which was absolutely necessary to recover prior to impact. *The failure of the instructor pilot to respond to the assumed abrupt power reduction with immediate power application might be attributed to complacency, inattention, preoccupation, a momentary distraction from either inside or outside the airplane* – or it is possible that he reacted instinctively to a landing flap situation instead of the approach flap situation and fully expected the flare to stop the high sink rate. The precise reason can never be known. The fact that the situation was allowed to develop to the point that a sudden power reduction could place the aircraft in extremis clearly illustrates the dilemma faced by all instructor pilots. At some point in the training of every student pilot it is essential to help him establish self-confidence in his ability to handle the aircraft. With some students this occurs naturally on the first few flights. With others, particularly those who have difficulty in some phase of the training, it takes longer. To establish self-confidence in a student it is essential that the instructor demonstrate his own confidence in the student by not continually riding the controls. The point at which this can be done with any student requires the finest degree of judgment on the part of the instructor pilot and if that point is not reached, the student pilot must obviously receive more training or be dropped from the program."

The A-3B Accident

A Porpoise

Another accident involved a pilot checkout (FAM-1) in an A-3B. In this case the flight took off from home field, climbed to altitude where certain high work was practiced and, after burning down to landing weight, returned to home field for practice touch-and-go landings. The first pass was waved off due to being slow in close. The next four passes were to touchdown. The pilot tended to get slow in close and to overrotate. This resulted in a higher than normal sink rate. The instructor pilot felt that the student pilot was also having trouble with lineup but that his landings were about average for FAM-1 landings.

The sixth landing was to be a final. As on the previous approaches, the pilot let the aircraft get slow. This resulted in a high sink rate. The instructor pilot called for power which partially cushioned the landing; however, the hard bounce and the addition of power caused the nose to rise. The pilot overcorrected and the aircraft came down nosewheel first, port wing low. The aircraft porpoised again. The instructor recognized the dangerous situation and called for a full power waveoff. The pilot added full power in an attempt to fly the aircraft out of the porpoise. However, he did not close the speed brakes. The aircraft left the runway to the right and continued across the field in a continuous right turn. The pilot applied full left rudder and full left aileron (right aileron down) in an attempt to get the aircraft out of the right swerve and into the air. After approximately 6000 ft of ground roll, the instructor told the pilot to abort. The throttles were brought to IDLE and the drag



The path of the A-3B after the landing porpoise.

chute deployed. The nose gear collapsed when the aircraft crossed a ditch parallel to the perimeter road. The aircraft crossed the road and came to rest 10 ft short of the boundary fence. The instructor secured both engine master switches. Without injury, all three personnel exited the aircraft via the upper hatch. The aircraft received substantial damage.

It was concluded that the primary cause of this accident was error in judgment and technique by both the pilot and the instructor. A higher than normal sink rate caused the aircraft to bounce into the air on touchdown. This bounce plus an addition of power caused the nose to raise and a classic porpoise maneuver began. The instructor correctly called for full power and

told the pilot under instruction to get the plane airborne. *However, the instructor had no experience as a qualified A-3 instructor and he failed to specifically call for closing the speed brakes.*

This last sentence deserves further comment and a paragraph taken from the AAR seems appropriate:

"The decision to FAM the pilot within the command seemed most reasonable at the time it was made. Only after the accident did it become apparent that too much emphasis had been placed on the checkout pilot's total A-3 experience rather than upon *his complete lack of experience as a qualified A-3 instructor.* It is recommended that in the future every effort be made to take advantage of the standardized flight instructors within the RAG squadrons. If aircraft availability should become a factor, strong consideration should be given to sending the command's aircraft to the RAG squadron in order to utilize the qualified instructors."

The T-33B Accident

Drove the Struts Through the Wings

It was the second T-33B familiarization flight for the pilot being checked out. He and his instructor took off and climbed to altitude for an area checkout. Following this portion of the flight, the instructor pilot took control of the aircraft and made a penetration to a GCA to demonstrate a touch and go landing. After turning downwind the pilot under instruction took control of the aircraft for practice landings in the VFR pattern.

The first landing was planned for an approach speed of 120 kts as indicated by NATOPS. Turning on to final the pilot under instruction was slightly high. As he approached the threshold he aggravated the situation by raising the nose; as the ball went off the mirror he took a cut planning to flare the aircraft to a landing. An excessive sink rate developed and the instructor attempted to salvage the situation by adding full power and pulling the aircraft to the buffet to cushion the touchdown.

The aircraft landed hard, bounced once and then became airborne. Both pilots checked their instruments and found normal indications. The flight was continued with four more touch-and-go's and a full stop landing without further incident. While taxiing in, the instructor observed the student was having difficulty controlling the direction. The instructor told the pilot under instruction to stop the aircraft. He then started making visual checks and noticed a bulge on the port wing. The aircraft was secured and towed to the ramp.

Further inspection of the aircraft revealed that the landing gear had penetrated the port wing, breaking the top and bottom rear spar caps and all adjoining structures. The damaged parts were protruding through the port wing 1-1/2 inches (see photo below).

In the analysis of the accident it was brought out that the pilot under instruction was transitioning from the TF-9J to the T-33B. It was noted that two important problems exist in the transition from the TF-9J to the T-33B. First, there is a significant change in scan pattern. The F-9 pilot relies mainly on an angle-of-attack system

The buckling of this T-33B's wing was caused by a hard landing.

and the T-33B pilot must rely entirely on the airspeed indicator for speed information. In addition, the physical difference in arrangement of instruments between the two aircraft requires an entirely new scan pattern development. Secondly, the T-33B requires attitude and power changes in order to effect a proper landing. In the F-9 aircraft, once the proper attitude and

airspeed have been established, little or no changes are required.

In this case, the approach was normal until short final where the pilot under instruction increased the nose-up attitude of the aircraft. At this point the ball was observed to rise and go off the top of the mirror. In an attempt to regain the proper altitude, the student reduced power to IDLE. This set the stage for the accident. At this point the instructor assumed control of the aircraft, applied full power and full back stick but an excessive sink rate had developed and the correction was ineffective. The aircraft contacted the runway, left main mount first. The landing was observed to be quite hard. Both pilots realized the landing to be hard and checked both cockpits for unsafe gear indications. None were found. At this point the decision was made to continue their touch-and-go landing practice. There was no attempt to check the wing area for damage. If the terminal damage did occur on this landing, it would have been visible from both cockpits. After the first excessively hard landing the student pilot made four more touch-and-go's and a final – all of which were considered normal.

The Supervision Factor

Although the cause for the P-3B accident mentioned earlier could not be definitely ascertained, it seems evident that, in all three accidents recounted, supervision – or lack of it – was a factor. There was an instructor pilot in the aircraft who was charged with supervising operations and in all three cases the instructor pilot failed to recognize the critical nature of the situation until after it was too late to take effective corrective action. The lesson seems plain – whether you are in the training command or in the fleet – anytime you are acting as a flight instructor, you must be alert to keep control of the situation and act in a timely manner to prevent the aircraft from being placed in a situation where recovery is impossible.

In the fourth accident, the pilot involved was no longer under instruction; however, he had only 49 hours in model. The aircraft involved was a jet (TA-4F) and the 49 hours in model also represented the pilot's total jet flying experience. Here's the story:

The TA-4F Accident

A Wrapped-Up Approach

The pilot was on an extended cross-country flight. After landing at an intermediate stop the pilot took off on another leg of the flight. The oxygen was not serviced at this stop because to do so would have involved a delay. Rather than accept this delay, the pilot proceeded to his next point of landing at low altitude.

There was a non-pilot passenger occupying the rear seat and enroute to the destination, neither the pilot nor the passenger wore their oxygen masks. The pilot, in fact, completely disconnected his mask from his hardhat. Approaching the landing field, the entry and break were standard and uneventful. The landing check was completed and the pilot felt that everything was normal and comfortable – up to the 90-degree position.

At the 90-degree position the pilot volunteered a gear check to the tower, picking up his oxygen mask/microphone with his right hand to do so. The landing check was acknowledged by the tower with clearance to land. After this distraction, the pilot looked back at his instruments to discover he was at 18 units angle-of-attack with a sink rate of 1500 fpm. *(The pilot was over the max gross weight for landing. – Ed.)* Witnesses state the aircraft at this time was extremely close aboard and descending rapidly and that the aircraft attitude was extremely wrapped up.

The pilot states that he immediately advanced the throttle to 90-92 percent upon noticing the situation which had developed. Discovering that this power addition was not stopping the sink rate, he further advanced the throttle to 100 percent. The final power addition was at or near touchdown. The aircraft contacted the runway threshold – left wing down with an extremely high sink rate. The aircraft impacted left wing tip, left inboard drop tank and left main mount first, followed by the nose wheel and finally the right main mount. The aircraft left the runway off the right side, approximately 750 ft from the threshold. The aircraft then arced left paralleling the runway, knocking down lights and distance markers. Damage inflicted upon the aircraft by these impacts is unknown; however, the flame pattern left by the aircraft began to grow larger and intensify. The aircraft, still at 100 percent, arced to the left, crossing the E-5 Mod 1 chain arresting gear and returned to the runway 1800 ft from the threshold where the remaining gear mounts, tanks and racks were evidently torn from the aircraft. The pilot reduced the throttle to IDLE upon returning to the runway. After traveling along the runway and just inboard of the chain in a shallow right hand arc, the aircraft passed over the arresting gear sheaves, burning the tapes. The aircraft continued to arc to the right and off the runway onto the shoulder and came to rest 2300 ft from the threshold. At this time, the pilot secured the engine, jettisoned the canopy and proceeded to utilize the harness quick disconnect feature of the seat. The pilot caught his foot on a cable and was unable to leave the cockpit. He manually unbuckled himself from the seat and, upon freeing his foot from the cable, exited the aircraft over the right side. The crew member in the rear cockpit manually unstrapped and exited the aircraft

The aftermath of an over-weight, wrapped-up approach.

over the nose, preceding the pilot's egress slightly. Both crew members were just moving away from the aircraft when the crash crew arrived. (See photo above.)

The reason for this hard landing and subsequent loss of the aircraft is fairly obvious – a high sink rate caused by high gross weight, too little power and a wrapped up approach. As soon as the excessive sink rate was noticed, the prudent thing to do would have been to add full power, level the wings and discontinue the approach. This, the pilot failed to do.

The Experience Factor

An endorser to the AAR stated:

"The record indicates that this pilot had no previous jet experience and was in fact transitioning from helicopter type to jet type aircraft during the period preceding this accident. The record indicates that his checkout was for the most part unsupervised and could be described at best as hit or miss. Under these circumstances, it is little wonder that the pilot completed his transitional training with marginal qualifications, as evidenced by the details of this accident."

The F-4J Accident

Another Wing-buster

The final accident which we will consider involved an F-4J. In this case the pilot had over 200 hours in model. Was lack of experience in model a factor in this accident? We'll let you judge; here's the report:

A flight of four F-4J's departed their base for a live missile firing exercise in a restricted area. Shortly after takeoff one of the F-4Js was notified by departure control that there was an excessive amount of fuel leaking from his aircraft in the area of the wing dump on takeoff. The F-4J acknowledged this information and after reaching VFR on top conditions took a check on the fuel leakage problem. Everything appeared to be in order as the fuel had stopped leaking; however, during

F-4J MLG strut protruding through the wing after the pilot attempted a flared landing.

the first run radar and ICS problems developed so the F-4J was detached from the flight and instructed to proceed to a landing at a nearby military airfield.

The F-4J proceeded toward the field and contacted approach control for a random radar approach and a GCA to a full stop. While descending through 15,000 ft the ICS problem cleared up and the pilot cancelled the instrument approach. At this point he contacted his base radio and requested clearance to return to his point of takeoff for a landing rather than landing at the field to which he had been directed by his flight leader. After some discussion he was directed to land at the alternate field specified by the flight leader. The pilot acknowledged these instructions and contacted approach control while VFR at FL 225 with 9000 lbs fuel on board. Weather at the time of penetration was reported as an indefinite 500 ft obscured with three-fourth miles visibility. Radar cleared the F-4J to 2500 ft; fuel was dumped beginning at 6000 ft and continued until level at 2500 ft and 15 miles. The F-4J was vectored to the final approach and commenced the descent slightly above the glide slope with a slightly high response from the controller all the way to touchdown. During the last four miles the pilot was given three slight heading changes. The wheels watch reported visual contact at one-half mile; the RIO had visual contact at 1-1/2 miles but did not report it until one-half mile. The pilot went slightly high on GCA over the landing threshold. At that point a high sink rate developed and the pilot apparently attempted to flare the aircraft. The aircraft contacted the runway, stabilator first, 250 ft short of the GCA touchdown point.

The aircraft impacted the runway in a stalled condition with sufficient force to cause the keel to buckle, all engine mounts to both engines to break, the stabilator actuator to break free from the airframe and both main gear to be compressed through the wings. The port main gear collapsed and the port wing drop tank ruptured into two separate parts. During the process of skidding down the runway and through the dirt to the final resting point, the aircraft lost its nose gear, right main gear, both wing pylons and the entire lower surface of the fuselage sustained severe deformation. Both the pilot and the RIO ejected successfully during the time the aircraft was skidding down the runway. The aircraft was engulfed by fire and was completely destroyed.

In the analysis of the accident it was concluded that the primary cause was that the pilot allowed a high sink rate to develop in close on a ground controlled approach. It was also brought out that the pilot had landed with a gross weight in excess of that recommended in NATOPs.

Were These Accidents Avoidable?

The aircraft accident boards (and the reviewing officers) were not able to deduce any good (or unavoidable) reason for any of the five accidents which have been recounted. It seems more than likely that all five of these accidents could have been avoided had the pilots been given better supervision at an appropriate time. The appropriate time in the first three cases is obvious – during the practice landings. In the case of the F-4J pilot, a flared landing was attempted over the max recommended gross weight. His attempt – and his failure to succeed – indicates a certain lack of knowledge and/or performance, relating to the fundamentals in the operation of his aircraft. It is just possible that somewhere along the line closer supervision would have exposed (and remedied) this apparent gap in his knowledge and performance. In the case of the TA-4F pilot, it is now (after the fact) evident that he should not have been authorized to proceed on an extended cross-country flight, considering his lack of experience in model and total jet time.

All of these accidents are indicative of a certain complacency on the part of pilots and their supervisors. Complacency is the deadly enemy of naval aviation safety and it is clear that there is no place for it during the landing phase.

This Is An Emergency!

WHEN you have an emergency what you need with the utmost speed is a clear channel for your distress signal. At the present time the integrity of the emergency frequency is being increasingly and seriously threatened by distress signals resulting from inadvertent activation of personnel locator beacons attached to parachutes in storage or in transit on the ground. In a letter to the Chief of Naval Operations, along with similar letters to all of the Armed Forces, the FAA (Federal Aviation Administration) has expressed growing concern over this problem:

"Reports from FAA field facilities indicate that such accidental distress signal transmissions are not a recent problem but that their frequency of occurrence has increased significantly in recent months. One field facility has recorded 14 such false alarms in the past six months. These bogus transmissions lasted from a few minutes to periods of nearly an hour until they were tracked down and shut off. Facilities have reported that false signals have been traced to parachute lofts, storage rooms, transmitter testing shops and to some pilots testing their own transmitters. Instances have also been experienced at one location wherein the signals have emanated from parachutes located in the air carrier baggage claim area, from equipment which belonged to transient military pilots.

"Base and unit commanders have been most cooperative in tracking down and extinguishing reported beacon signals on the emergency frequency which have been inadvertently activated; however, many commanders have neither the equipment nor facilities to locate such signals quickly or to permit proper and necessary testing of this equipment on the ground. Further, we are advised that certain plastic plug inserts which have been designed to inhibit signal generation from the beacons until the parachute is deployed often fail during handling due to improper fit. Redesign or equipment modification may be required to correct this unsatisfactory condition.

"This recurring problem must be solved before it ceases to be simply an aggravating, although serious, nuisance and becomes a critical barrier to the intended use of emergency equipment and the distress frequency. The repeated accidental transmission of these signals tends to degrade the emergency channel which could delay responsive action in the case of an actual distress signal requiring quick action."

All personnel who have occasion to use or handle such equipment must be aware of the problems which may be caused by careless actions. Let's save our distress signal emissions for the time they'll do the most good!

Fasten Your Seat Belts, Please

By Anymouse

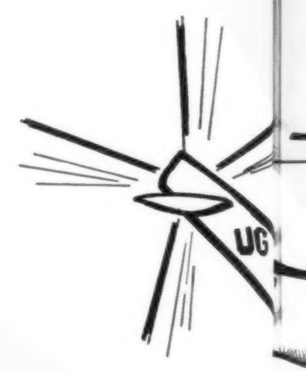
JIM and I delivered the H-3 to NAS Jax, arriving in time to enjoy another *Stars and Bars* night at the Club. We managed to terminate the festivities at a reasonable hour, though, as we were scheduled to pick up another H-3 from PAR (Periodic Aircraft Rework) on the following day for return to NAS Quonset Pt.

We arose the next day to find the bad weather that Aerology had predicted. It was sodden and gloomy as we gathered up our gear and departed the BOQ to look for breakfast.

By 0900 we were over at the NARF (Naval Aircraft Rework Facility) Hangar and learned that our H-3 was ready for the return flight. So we sauntered out and got ready to do a careful preflight. I remembered that this was a *PAR bird.* You know, one of those "paint and return jobs." Maybe we'd better take a real good look at this one. The preflight turned up few discrepancies, the main one being an over-filled utility reservoir. We were indeed fortunate. The first turn up revealed that the No. 2 generator wouldn't come on the line and the ASE wouldn't engage. After some tinkering by what appeared to be an army of technicians, the generator worked and the ASE engaged but showed hardovers in three channels. By this time everyone's good frame of mind was getting a bit tarnished but the technicians changed the channel monitor panel and the ASE appeared to work properly.

A last minute check of the weather indicated that 1000 ft ceilings were forecast up through Charleston and after that it was AOK. We were apprehensive about going IFR without a test flight but with the prospects of a comfortable night at Seymour-Johnson (our next stop), we filed VFR under the overcast and decided we could always change to IFR later if necessary. Everything checked out including tacan and IFF, both of which we would be very happy to have a short time later.

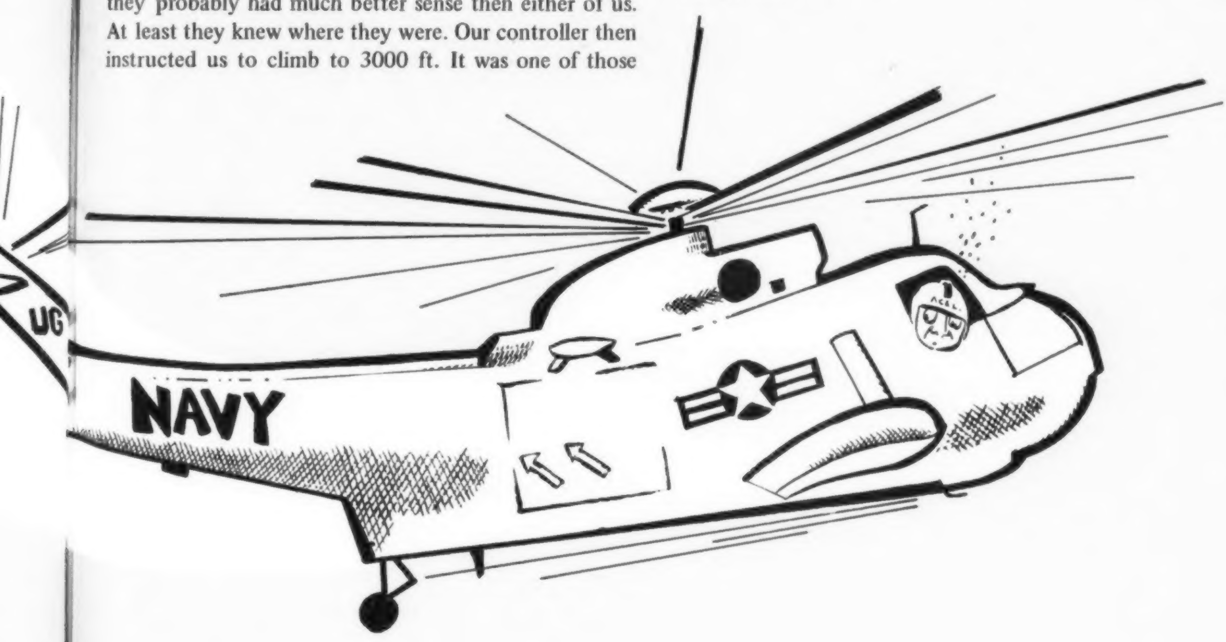
As we approached Brunswick things were getting a little grim. The broken layer was getting down on the 500 ft side and there were lots of showers and some patches of fog. We checked with Glynco Tower and got the latest weather which called our 500 ft layer scattered and indicated we could expect the same for Savannah and Beaufort. What promised to be a no sweat flight was getting to be a lot of concern. The visibility over the water was terrible so we decided to go the inland route. This was one of several mistakes. The weather closed in rapidly and we were soon down to 200 ft on the radar altimeter trying to stay clear of the clouds. Jim's remark that we weren't exactly VFR anymore didn't add much to my peace of mind. We were, if anything, just a little bit IFR. We spotted a small stream or bayou and decided that this might be a good thing to follow before we ran into some radio towers. As luck would have it the stream dead-ended. Jim was petrified that I'd get a case of vertigo and fly into the ground and



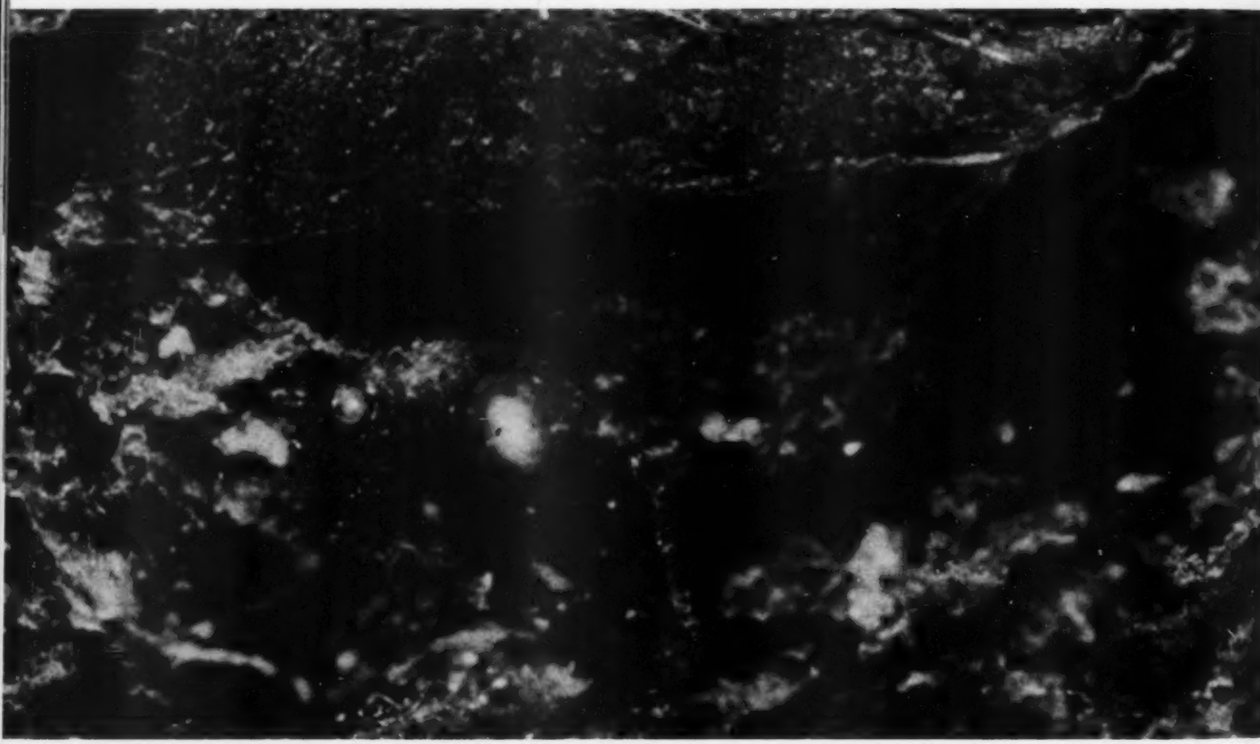
wouldn't turn his head to switch the radios over to Savannah Approach Control. It was probably a good thing as Jim suddenly yelled: "Lookout for the water tower." Before I could look up Jim had snapped us into a 30 degree bank to the left and the radar altimeter eased to 150 ft. I looked out to my right and saw the water tower fade into the rain and fog and at the same time observed the approach end of a runway with the numbers 30 painted on it in bold relief. To this day we have never decided whose field we flew over at 150 ft. This shredded the last of my shaky composure. Next we crossed a development of homes at 100 ft and then, at last, a clear spot and another bayou. Down we went to 50 ft following the water course between the trees until it dead-ended also and left us in a rain and fog-shrouded hover. Jim engaged the automatic hover mode and set the altitude for 60 ft. The next thing was to call someone and get an IFR clearance. Marine Beaufort seemed like a reasonable idea – in order to avoid a flight violation from Savannah or Hunter if they had observed our unprecedented arrival and departure of their airspace. The first call was surprisingly successful. We explained our predicament as gracefully as possible. After straightening out the fact that we were a helicopter and really were in a hover and a couple of squawk idents, we were located 30 miles southwest of Marine Beaufort. While awaiting our clearance Jim observed some ducks hiding in the overhanging brush. At this point I realized they probably had much better sense then either of us. At least they knew where they were. Our controller then instructed us to climb to 3000 ft. It was one of those straight up jobs at 90-95 percent torque (for you H-3 drivers). As we passed through 500 ft I observed a group of 1500 ft radio towers a short distance away. I remember only one other climbout of this nature but that's another story and we weren't hovering in the swamps of Georgia.

At 2500 ft I eased the nose over to get some airspeed. With the confidence of the controller revitalizing a little of our own, we finally leveled off at 3000 ft and 100 kts. We all started to breathe a little easier now and our crewman had put away his rosary. Shortly after this we received another clearance to 9000 and soon broke out on top. What a day! Somehow, there had to be an easier way to make a living. Later as we talked about the situation we even had a few nervous laughs. I made up my mind that it was going to be a long time, *if ever again,* before I'd be VFR when I wasn't. As for those flight planning sections, they are going to get a lot more of my attention.

This illustrates the need for planning every flight. It is also an outstanding example of how a low altitude flight under marginal VFR conditions can deteriorate into an extremely hazardous situation. Taking off under such marginal conditions with the thought that, "We can always change to IFR later," is only postponing hard decisions which can be more objectively made in the unhurried atmosphere of the flight planning room – on the ground – Ed.



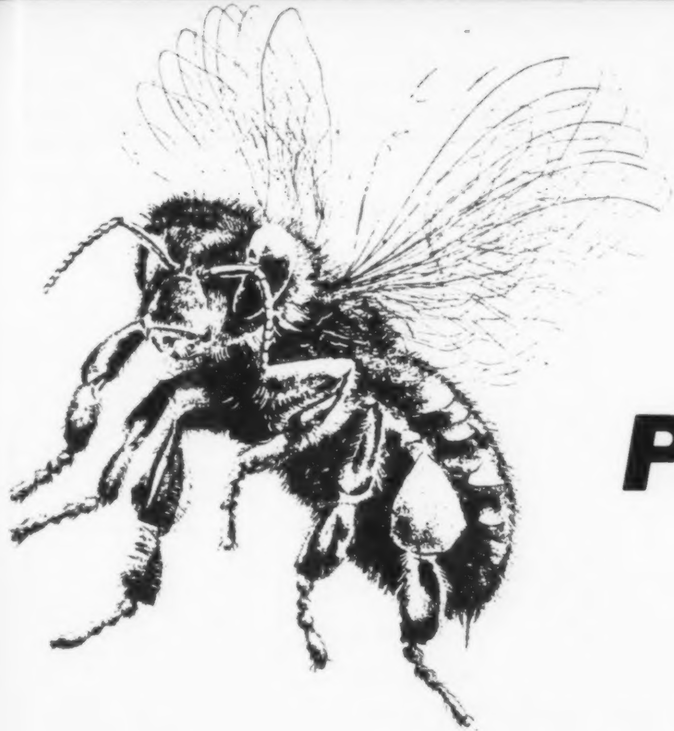
Aircraft Pitot - Static Systems



Material removed from aircraft pitot-static system, showing head and wing of insect (magnified 12 times).

SHORTLY after an S-2 aircraft became airborne, both the pilot's and copilot's airspeed indicators became erratic and finally unusable. A landing was successfully made using power settings for speed control.

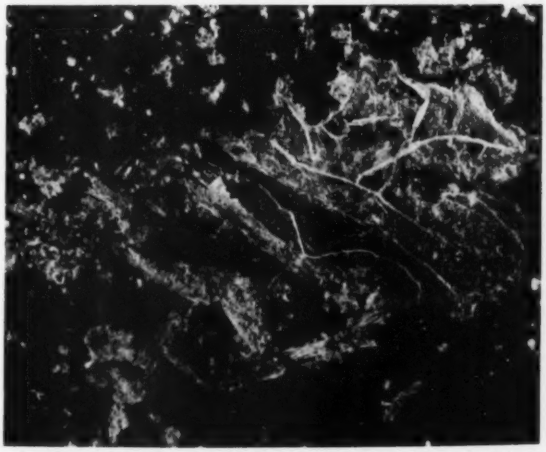
This report is typical of a substantial number of incidents/reports (see accompanying box) which have been received by the Naval Safety Center involving the malfunction of instruments associated with aircraft pitot-static systems.



Problems

In this case the investigation determined that the erratic airspeed indication was caused by insects nesting in the pitot tube. This particular aircraft was based in the Caribbean area and the insect involved was identified as a leafcutting bee. The identification of the insect may not be as important to flight safety, however, as the recognition that there are a number of types of insects which can (and do) enter the aircraft pitot-static system and cause subsequent malfunctions of one or more flight instruments.

The problem of insects blocking pitot-static systems is one which occurs most frequently in the Caribbean and other tropical areas. In most cases squadrons and stations based in the area are alert to this hazard and take all possible precautions to ensure against it. On the other hand, squadrons which deploy to these areas from the North may not be aware of this potential hazard. This is illustrated by the experience of a P-3A squadron whose aircraft deployed to the area for a short period. Two incidents of blocked pitot-tubes were experienced during the first four days of operation. In one of these incidents both the pilot's and the copilot's airspeed indicators failed to indicate during the takeoff roll. The takeoff was successfully aborted. In both cases the investigators determined that pitot tube covers were in regular use when the aircraft were on the ground, suggesting that insects may have entered the pitot tube

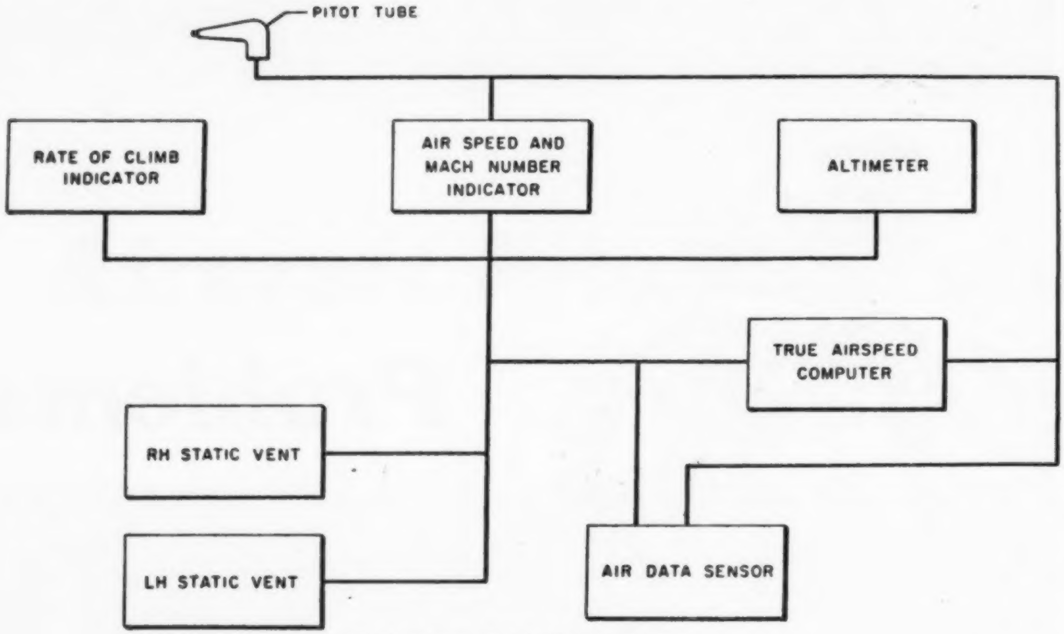


Insect wing and leg — part of material removed from aircraft pitot-static system (magnified 12 times)

opening via the openings in a loose fitting pitot tube cover. This indicates that it is not sufficient to merely install the covers; they must be installed in such a manner that the entry of insects is positively precluded.

Pitot Tube Covers Not Complete Answer

The installation of pitot tube covers when aircraft are on the ground is not the complete answer, however. Other incident reports show that flight instrument



Block diagram of typical pitot-static system.

During the period 1 January 1965 to 30 April 1969, there have been 22 incidents or accidents reported to NavSafeCen involving malfunctions of aircraft pitot-static systems. The tabulation below breaks these incidents down by type aircraft involved and damage incurred.

Aircraft	No. of Reports	Damage
A-3	1	None
A-4 (all models)	3	1 subs; 2 none
F-4	5	2 ltd; 3 none
F-8	1	1 minor
TF-9	2	1 ltd; 1 none
EF-10	1	1 ltd
F-11	1	1 ltd
P-2	4	4 none
P-3	3	3 none
UH-16	1	1 none

These are the reported incidents; however, it is known that some other incidents have occurred which have not been properly reported, e.g., an incident report mentioned in passing that ten F-8 incidents involving blocking of pitot-static systems had occurred during an eight-month period at one Caribbean operating base.

failures also occur because of the entry of insects or other foreign matter into *static air vents.* In considering the overall problem it may be helpful at this point to review the operation of a typical aircraft pitot-static system:

Typically, the pitot-static system supplies ram air pressure and/or static (atmospheric) air pressure to the instruments and equipment which require one or both types of pressure for operation. Although the system is often referred to as a single system, i.e., *pitot-static system* it is in reality composed of *two distinct systems which never merge,* i.e., the pitot system which provides ram air pressure and the static system which provides static air pressure. (Note: In some older aircraft, the pitot-static probe had openings for both pitot (ram air pressure) and static (atmospheric) air pressure. Now, however, most aircraft have pitot tubes which provide for the input of ram air pressure only, with static (atmospheric) air pressure being obtained through static air ports located in one or more places along the fuselage.)

Those flight instruments which require both types of air pressure (ram and static) have separate openings in the instrument case for the admission of the two types of air pressure (see illustration of typical block diagram). This point is mentioned only to further illustrate that the pitot system and the static system are separate systems. Typical pitot-static systems include these components:

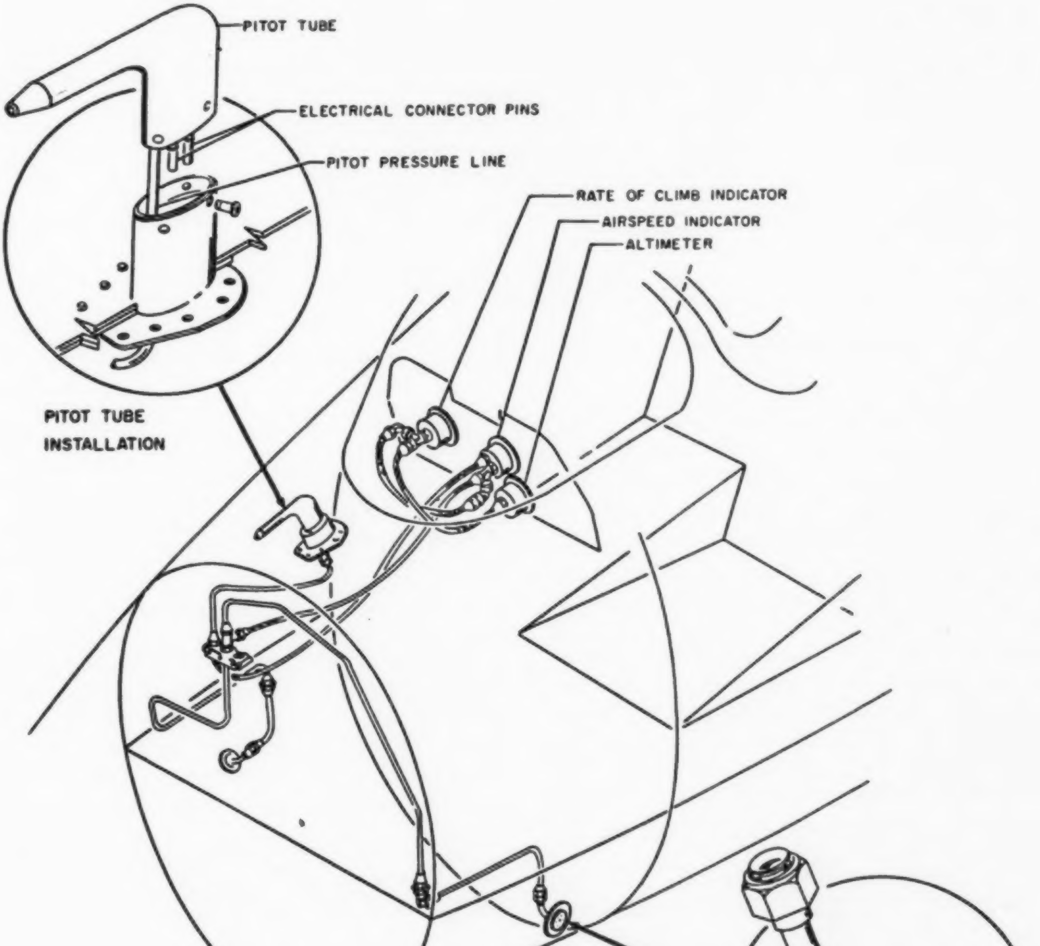
• Pitot tube (for the input of ram air pressure).

• Pitot piping and drains (for routing of ram air pressure).

• Static air vents (for input of static air pressure).

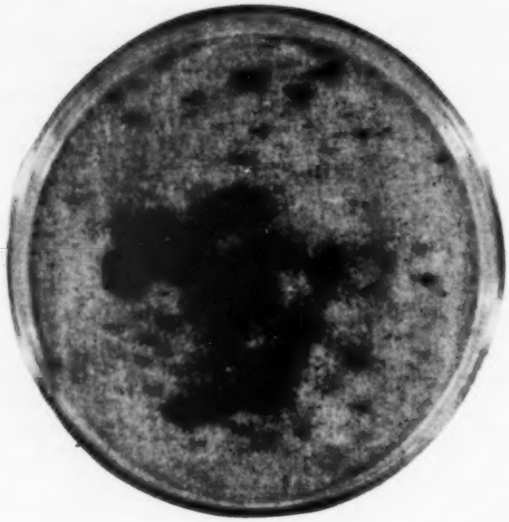
• Static piping and drains (for routing static air pressure).

pressure differential between the pitot (ram) and static air pressures. The altimeter and the rate-of-climb indicator, on the other hand, need only static pressure to function. Therefore, if the pitot tube is blocked, some instruments (those which require ram air pressure) may be lost *but* if the static vents or lines become plugged, all pitot-static instruments could be lost.



Typical pitot-static system layout.

Ram air pressure enters the pitot-static system through the pitot tube and is directed to the airspeed indicator and other instruments which require ram air pressure. Typically, these instruments include the Mach number indicator, true airspeed computer and air data computer – in addition to the airspeed indicator. All of these instruments *also* require an input of static air pressure (from the static vents) and function through the



Decomposed insect matter found in aircraft pitot-static system (displayed in 3-inch diameter dish).

Insects Are Not The Only Problem

A report from Adak, Alaska, shows that pitot-static system blockage is not limited to tropical areas nor is the foreign material blocking the system limited to insects. In this case a P-3B was taking off on a local VFR flight. The copilot was calling out airspeeds on the takeoff roll while the pilot was cross-checking airspeeds on his own indicator. He felt that the copilot was calling airspeeds late and elected to lift off on his own airspeed indicator which appeared to be operating normally. On the climb out, the pilot's airspeed indicator dropped to 85 kts and the copilot's airspeed indicator dropped to zero. Pitot heat was ON and operating properly at the time. The pilot returned to the field and made a successful straight-in approach and landing using the angle-of-attack indicator.

During the subsequent investigation the pitot tubes were removed from the aircraft and a black, carbon-like ash was tapped out of both of them. This substance was very similar to the volcanic ash that settles out of the Aleutian atmosphere.

The C.O. of the squadron, commenting on this incident, noted the importance and usefulness of having a properly calibrated and properly operating angle-of-attack system.

Problem Under Study

The overall problem is under study by NavSafeCen and NavAirSysCom; however, there does not appear to be any simple solution in the offing. One recommendation which has been advanced is that a universal static port cover be designed and fabricated which will:

- Not mar or distort the orifice but will reduce the opening sufficiently to preclude the entry of foreign matter.
- Blow away automatically during takeoff if it is inadvertently left installed.

This recommendation is under study along with others. In the meantime, maintenance and operations personnel should be aware that a potential problem exists and should take steps to ensure, insofar as possible, that foreign matter does not enter pitot tubes or static ports. Such measures might include:

- During ground periods in geographical areas of high insect and moisture density, ensuring that pitot covers are installed in such a manner as to positively preclude insect entry.
- Briefing pilots on acceptable tolerances allowed in flight instruments and require a prompt report of any discrepancy which may indicate partial blockage of the system.
- Ensuring that angle-of-attack systems, on aircraft so equipped, are properly maintained in good operating condition.
- Clearing any system suspected of being blocked using procedures specified in the appropriate maintenance instruction manual.

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Naval Aviation Safety Goals:

Do We Need a Slogan?

THE ULTIMATE GOAL of naval aviation safety is to reduce accidents and the cost thereof, in terms of lives and money, to the irreducible minimum. This goal, unfortunately, is not easily comprehended in terms of the everyday tasks we perform today, this week or this year. It seems to us that we might more readily gage our progress toward the ultimate goal if we were to adopt interim goals with deadlines that will arrive in the reasonably near future.

Such an idea is not new to naval aviation safety. At the end of FY 54, the all-Navy aircraft accident rate stood at 3.8 accidents per 10,000 flight hours. During FY 55, the slogan, "3.5 in '55," came into wide usage and by the end of FY 55, the all-Navy aircraft accident rate had been reduced to 3.33 accidents per 10,000 flight hours.

We do not wish to state that the rate of 3.33 resulted from the adoption of the slogan "3.5 in '55," but it seems reasonable to believe that the widespread use of this slogan *did* serve to focus more attention on the subject of accident prevention than would have otherwise been the case. Perhaps the slogan came to the mind of the typical Navyman from time to time and served to remind him of the need to discriminate just a little closer between the various courses of action open to him at the time.

We believe there is a place in the naval aviation safety program for any positive approach which promises to intensify accident prevention efforts. We, therefore, propose the following slogan in FY 70:

One Point Oh in Seven Oh
(1.0 in 70)

This slogan incorporates the goal established by CNO in his dispatch of June 1969. It is realistic and possible only in the form of an all-hands program, accomplished in a day-by-day manner. Safety is not just a command function, but rather an attitude that must be universal.

What could we expect as the practical result of reducing the all-Navy aircraft accident rate to 1.0 in FY 70? Let's answer this question by comparing the projected losses in FY 70 (if the 1.0 goal is realized) against the losses which we suffered in FY 69:

FY 69 (Rate of 1.42)	FY 70 (Projected rate of 1.0)
Strike (ALFA) Accidents – 323	227
Dollar Cost – $513 million	$359 million

While the savings in terms of aircraft and dollars are impressive, our real savings will be in the prevention of injury and the loss of lives. So, apart from the realism of the goal, there's no question but that it would also be a humanitarian endeavor.

We believe that most of us are able to call up unexpected resources in order to achieve desired goals. We also believe that there are few goals more worthy of our best efforts than *that of effecting a dramatic decrease in avoidable aircraft accidents.*

Opinions Solicited

No such goal can be achieved without the support and thoughtful action of every man in naval aviation. We, therefore, offer this slogan only as a *proposal.* We urge the thoughtful consideration of every reader and solicit reader opinion, to include the answers to these questions:

- Does the adoption of a slogan (any slogan) have merit?
- Do you favor the proposed slogan?
- Do you have an alternate slogan to propose?

Address all comments to the Editor, APPROACH, Safety Education Department, Naval Safety Center, NAS Norfolk, Va. 23511.

Carrier Landing Trend Analysis Form

By LT D. H. Ryder, VA-72 LSO

THE taste of a hard night's liberty is gone and the all pilots' meeting is convened. *Paddles* steps forward to discuss squadron glide slope performance during the last at-sea period.

Is he going to tell us that the one-eighty is a mile and a quarter from the ship; that it is a good idea not to overshoot or that it's a good idea to fly the ball?

Not this time. This time he has some news. He has something pertinent to the individual pilots about *trends* in their past carrier landing performance. He is able to do this because he has adopted a form which simplifies trend analysis. By utilizing a trend form like this it is possible to detect any recurring error, however slight.

The form is designed to break a pass down into its various components and to look at each pass from three points of view:

The first view is of the glide slope from start to ramp. Noted in this section are the tendencies at each position in the pass: TMP (too much power), S (slow), LUL (lined up left), etc. The second section is an attempt to show why the deviations from the optimum occurred in terms of attitude, line-up and power control. The third area (remarks) is for contributing external factors, e.g., axial wind, smoke in the groove – or excuses such as "I was cut out . . . I was following a heavy (an A-4, a fighter) . . . I was looking for my contact lens . . . etc."

By looking down the various columns it is simple to spot recurring problems as well as new quirks which might ordinarily be overlooked in the ritual debriefings.

With the seeming lack of lift in dark air and the propensity of hooks to either shrink or stretch at night, it is also helpful to separate the day from the night passes.

By utilizing this form, when copying passes at the end of the operating period, there is no increase in paperwork. The results are more easily interpreted and they are more meaningful to the individual pilots in terms of trends.

About the Article

LT D. H. Ryder, VA-72 LSO submitted the article, "Carrier Landing Trend Analysis Form," however, he has been careful to note that the idea is not original with him. He credits it as an adaption of an idea offered by VSF-1's LSO and CVW-8's LSO, CDR Jack Flick.

"At VA-72, we have only recently begun to use it but results have been remarkable. Know-it-all types ranging from nuggets to CDRs have had an almost uniform reaction:

'Hey, I didn't know I was doing that . . . and all the time, too!'

"Unfortunately, the concept of this form has not found wide utilization and is unknown in many air wings. It is an excellent training aid and needs only a little publicity to become the Navy's most useful piece of paperwork. The trend sheet (with the article) is a random sample from our last at-sea period. It is easy to see how the form simplifies trend analysis."

Superiors in the chain of command have been equally enthusiastic in endorsing the trend analysis form:

The C.O., VA-72 says:

"Getting aboard has been and will continue to be in the forefront of the naval aviator's mind. The *professional* naval aviator desires to do it well. This proposed carrier approach and landing trend analysis (form) should be a valuable aid toward better carrier approaches and landings."

The Commander, RCVW-8 says:

"An effective analysis of pilot carrier approach performance is essential in the maintenance of the high standards required by today's operational environment. This system has fulfilled the requirement by providing the LSOs, pilots, commanding officers and myself with an accurate picture of progress as well as the problems of the individual aviator."

This trend analysis form appears to be a simple and effective way to assist pilots in improving their carrier landing performance. NavSafeCen is happy to present it for the consideration of other air wings and squadrons.

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BLUEHAWK HOOK ANALYSIS

PILOT ______________________ FROM: ____________ TO: ____________

DATE	D/N	GRADE	PATT	X	IG	IM	IC	AR	SPEED	LU	PWR	AW	WIRE	REMARKS
1/17	D N	OK											1 2 3 4	ANTI-SMASH LITE
1/19	D N	OK					(ƒIC)						1 2 3 4	
1/20	D N	OK					(CIC)						1 2 3 4	
1/20	D N	OK			DNIG								1 2 3 4	
1/23	D N	(OK)					LULIC			LLU LULIC	NEP		1 2 3 4	
1/24	D N	OK					(↳IC)						1 2 3 4	
1/25	D N	→							F	LLU			1 2 3 4	
1/25	D N	(OK)						LOBAR	F				1 2 3 4	
1/25	D N	OK		HY									1 2 3 4	
1/26	D N	OK	(AA)						(FOOT)				1 2 3 4	
1/26	D N	(OK)			DNIG	TMPIM				LLU			1 2 3 4	
1/27	D N	→					↳				TMP		1 2 3 4	OVERROTATE
1/27	D N	(OK)					CIC LULIC			LULIC			1 2 3 4	
1/28	D N	OK											1 2 3 4	
1/28	D N	OK					(↳K)						1 2 3 4	
1/29	D N	→					CIC						1 2 3 4	4
1/29	D N	OK				HIM				(LLU)			1 2 3 4	23
1/30	D N	OK											1 2 3 4	
	D N												1 2 3 4	
	D N												1 2 3 4	
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	D N												1 2 3 4	

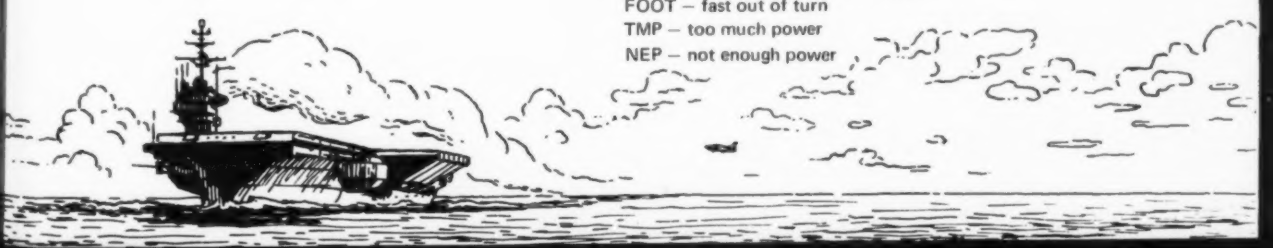
This example illustrates the use to which the *Form* can be put in order to provide readily usable trend information on an individual pilot's landings over a period of time. The completed form contains many abbreviations and symbols which are used by LSOs to describe landing performance. The LSO NATOPS manual contains a list of symbols in common use, e.g.:

Headings on form

GRADE – self-explanatory
PATT – pattern
X – start
IG – in groove
IM – in middle
IC – in close
AR – at ramp
speed – self-explanatory
LU – lineup
PWR – power
AW – all the way
WIRE – wire caught
REMARKS – self-explanatory

Other symbols used in body of form

( ) – parenthesis around any symbols signifies "slightly," i.e., (F) means "slightly fast."
↗ – symbols such as this are graphic representations of aircraft's attitude or movement as perceived by LSO.
OK – self-explanatory
B – flat glideslope
DNIG – drop nose in groove
TMPIM – too much power in middle
HIM – high in middle
CIC – climb in close
LULIC – lineup left in close
IC – in close
LLU – late lineup
LOBAR – low and flat at the ramp
FOOT – fast out of turn
TMP – too much power
NEP – not enough power



ON THE GLIDE SLOPE

A ground controlled approach is limited in precision and accuracy by your skill and ability as a pilot in complying with controller instructions and your knowledge of procedures. These thoughts are offered to assist you in developing your skill and to review the procedures with which you should be knowledgeable.

The A B C of GCA

Approach. Know the approach before you put yourself into it. Study the IFR Supplement, which contains information about the glide slope angle, decision height and the weather minimums required to commence the approach.

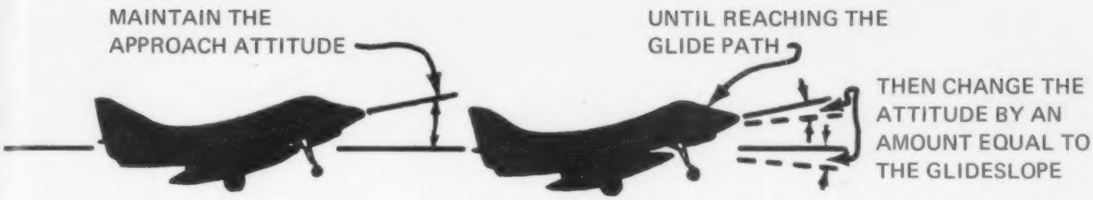
The difference between a 2.5 degree glide slope and one which is 3 degrees is seemingly minor. However, it may be quite a shock to find that your normal procedures aren't keeping you close to "on the glide path." Rates of descent for various ground speeds and glide slope angles can be found on page IX of the FLIP Low Altitude Instrument Approach Procedures. This information may not be easily available in the cockpit but you can develop a handy "thumb rule" to keep in mind.

1. Know the average "no wind" rate of descent for your aircraft for a 3 degree glide slope, i.e. your aircraft has an approach speed of 130 kias then your rate of descent should be 690 ft per minute.

2. For each 10 kts change of ground speed the rate of descent must be adjusted 50 ft per minute, i.e. with the same aircraft above you make an approach with a 10 kt head wind (ground speed is slower) the rate of descent should be 640 ft per minute.

3. A one-half degree difference in glide slope will require a change of 100 ft per minute in rate of descent, i.e. with a 2.5 degree glide slope in the example above, the glide path becomes 590 ft per minute with no wind and 540 ft per minute with a 10 kt head wind.

Basic air work. Plain old BAW is the key to flying a precise GCA. Concentrate on flying the approach with exactness. Do not allow yourself to become distracted from flying your best instruments by cloud layers or occasional sightings of the ground through breaks in the clouds. Regularly practice slow flight with emphasis on determining the power and attitude necessary to establish a rate of descent equivalent to that which you would expect on a GCA. Remember, power plus attitude equal performance. Set the engine power and aircraft attitude so as to be "on speed" well prior to intercepting the glide path. Upon reaching the glide path reduce the power by the amount required to establish the proper rate of descent. Make a coordinated attitude change by lowering the nose of the aircraft. (Three degrees on the attitude gyro for a three degree glide slope.) Concentrate on maintaining the aircraft attitude and adjust the power to maintain airspeed. This power/attitude combination should result in a rate of descent necessary to establish the proper glide path.



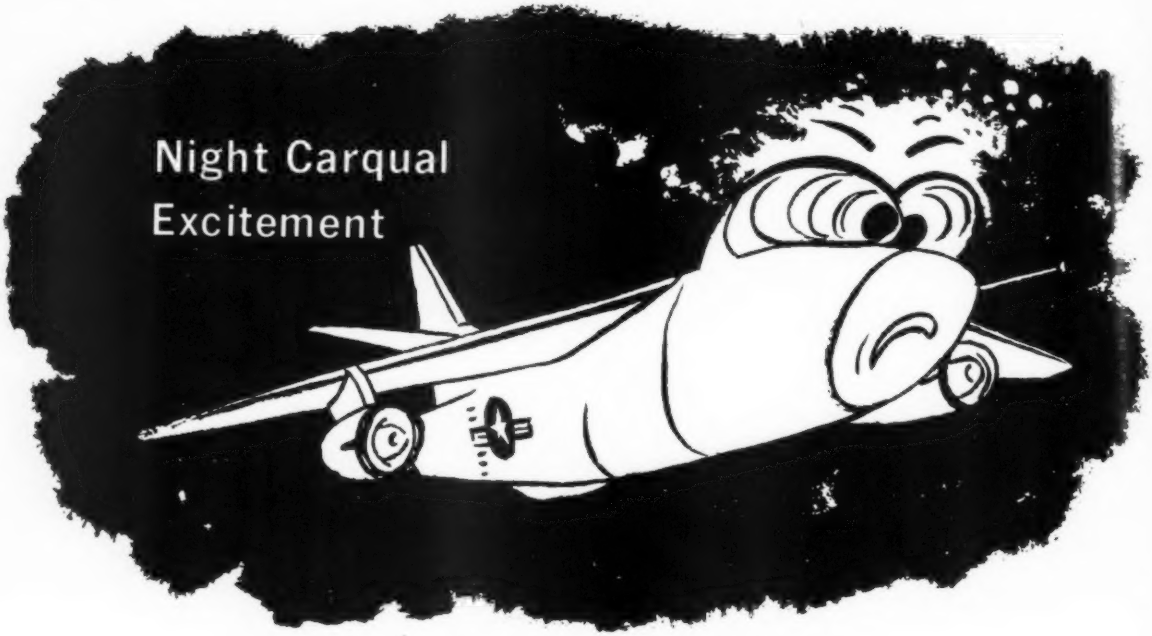
Check the vertical speed indicator to see if your power/attitude is correct. Don't wait for the controller to issue glide path corrections. Stay ahead of him. If you allow the attitude to wander and over control power, the glide path will not be stable. Fly attitude. Make power corrections very small and reset the power exactly as needed after the correction. Power corrections, on the glide slope, should generally be limited to about one-third of the amount initially reduced to establish the descent. For example: If the engine thrust is reduced by reference to the engine fuel flow and a change of 600 lbs per hour will establish the glide path then a correction of 200 lbs per hour should be the maximum change during the approach. A power change should generally be accompanied by an attitude change. Therefore, it follows that the attitude change should not exceed one degree. One degree may not seem like much but it is one-third of the glide slope angle. Remember exactly where to reset the power and the attitude to return to your original rate of descent. If the controller calls you slightly above or below the glide path, make this small correction and be patient. It's the trend of the approach that is important.

Caution. Plan ahead in order that you will not be rushed on final. Be sure the aircraft is configured for landing and "set up" for the approach prior to reaching the radar final. Maintain a DR plot of your position relative to the field so that you're not caught on final without the landing cockpit checklist complete. Radar vectoring and GCA's have their own special hazards. Keep the approach chart out in case you need it for orientation, location of terrain obstacles, determination of minimum safe altitudes or to complete a published final approach in the event of lost communications. Understand your lost communications instructions and don't accept instructions based on equipment you can not use (i.e. ILS instructions for a tacan only aircraft). If things get mixed up somehow, climb to the minimum safe altitude and then figure it out. Avoid becoming so engrossed in maintaining headings and glide path that you are not aware of your height above the ground. In those last few seconds prior to reaching minimums your concentration on maintaining course and glide path may become secondary to looking for the runway environment. Avoid the tendency to stare at, or search for, objects outside the cockpit while marginally VFR. Make your lookout a part of your scan and fly precise attitude and heading.

Know all about the approach, fly strictly power and attitude and be safe. It's easy as A.B.C.

If you have a question concerning any phase of instrument flight for which you cannot find a satisfactory answer, send it to the Commanding Officer, VA-127, NAS Lemoore, Calif. 93245, who has volunteered to do the necessary research and supply the answers.

Night Carqual Excitement



WHILE on a mission out of NAS Westcoast, for night carquals in a KA-3B on USS Boat, the following interesting events occurred:

After climbing to FL 210 I was instructed to marshal on the 105-degree radial, 36 miles from USS Boat. After several delays on an estimated 1800 *Charlie*, I started to experience a 40-degree left tacan lock-on. I then asked the ship to monitor my pattern so I wouldn't drift too far.

The ship was continually requesting several aircraft to squawk STDBY/NORM/IDENT so it appeared that they also had me on radar. About 1900 I was instructed to take up heading 350, angels 21.0 and warned to be alert for other aircraft from the ship which were operating in the same area.

I proceeded north for about 40 miles (passing the inbound Fox Corpen) and finally broke through the chatter on the air to inform the ship that I was about to go feet dry over LAX. I was then told to marshal 180/20. Back to the south I went, in VFR conditions, above a cloud layer with tops at about 8000 ft. Just as I reached the new marshal, I got signal *Charlie*, heading 330 degrees, to report platform and take angels 1.2. Down I went, staying very slow with a high rate of descent due to the close starting position. Again I passed the inbound Fox Corpen, advised the ship of this and was told to continue heading 330 degrees. As my tacan swung to my 7:30 position, I broke out below the overcast. It was *very* dark. I observed the lights of the Avalon marina on Santa Catalina island at 11 o'clock and Long Beach in the distance at 1 o'clock. When the ship asked my position it confirmed my suspicions that they didn't have the faintest idea where I was. About this time my tacan started to break lock, probably due to the land mass of the island between us.

Not really knowing the exact height of Santa Catalina, I started a right climbing turn to 3000 ft. (By past experience I figured that this would be high enough.) Halfway through the turn I went *Popeye* in a rain shower. Oh joy! Vertigo a batch!

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

Suddenly, the ship seemed to hold me again, telling me to take up heading 240 degrees, angels 1.2. Dandy! I requested the height of Santa Catalina island and received the reply, "We're checking on that right now." Swell!

The next call tells me the island is 2100 ft high and requests my angels. I reply 3.0 which seems to satisfy them – and me, too. Now I'm given a new heading of 260 degrees and told to descend to angels 1.2. (I think they really hold me now.)

The ship reports that aircraft are being flown in a right-hand bolter pattern due to another carrier which is operating in the area to port. I think to myself, "Hope I get the right boat."

I'm now at 6 miles, going dirty. The ship reports aircraft turning in ahead of me from the right. I see the ship at 3 miles and report. It doesn't look quite right. The ship advises me to turn right to 310 degrees. The ship looks better at this angle but only a few center lights are visible and no drop lights. I query the ship about the drop lights – and on they come.

Hurray! I can see the meatball. And after a slight jog my lineup is fair. Now I'm in close. I make a final lineup correction and then comes the easiest part of the whole flail – the night trap!

I'd like to end my report with a few recommendations on how to prevent or minimize the type of problems which I encountered:

- Never assume that night carquals are *routine.*
- Never assume that the ship knows where you are all the time.
- Know the height of the terrain in the area where you will be working – and for a good distance around.

Finally, I recommend that the ship insure all is in readiness for the recovery so as to provide maximum assitance to the pilot in this, the most demanding part of naval aviation.

Night Carqual Mouse

Your recommendations are well stated. No flight should ever be considered routine. Or more to the point, no flight should ever be undertaken with the complacent expectation that nothing can or will go wrong – particularly one as demanding as night carquals. Also on the matter of safe terrain clearance, a number of tragic and avoidable accidents have occurred during the last few months because of failure to maintain safe terrain clearance (refer to the lead article in the May 1969 APPROACH). Many times there will be agencies or individuals who share in responsibility for such accidents but in the final analysis the pilot has the ultimate responsibility. As you aptly state, he should know the height of the terrain in the area he is working – and for a good distance around.

For C-2A and E-2A Pilots (and Others)

INFORMATION revealed to me via readyroom conversation speaks of hot takeoffs in C-2A and E-2A aircraft by raising the gear immediately after takeoff. I won't even get into the nature of the pilot who dares this dangerous stunt but rather explain what occurs.

First, we all know that the first action of the C-2A/E-2A main landing gear is to rotate 90 degrees prior to raising. This rotation causes an increase in drag and unless the pilot can pull some more power out of the seat of his pants the plane will settle. It has happened to some pilots in these aircraft. Others have been lucky but very close.

So the word is don't rush to raise the wheels. The plane has plenty of power at most weights and temperatures. It has a hook to catch the gear at the end of the runway if necessary. There is no reason to suck up the gear right after takeoff – *no reason at all.*

ASO Mouse

We gave the C-2A and E-2A NATOPS manuals a look and here's what they both have to say on the subject of raising the gear after takeoff:

- *Under takeoff technique, NATOPS says: "The landing gear should be retracted as soon as a safe landing cannot be made on the remaining runway."*
- *Under climb checklist, NATOPS says: "When the aircraft is definitely airborne and climbing: Landing gear – UP."*

The intent of both these NATOPS statements is diametrically opposed to hot-pilot tactics such as sucking up the gear immediately after takeoff. Your Anymouse report gives one good reason, i.e., increased drag resulting from rotation of the landing gear during retraction. Furthermore, even if the gear did not rotate (which is the case with many aircraft), prematurely sucking up the gear is asking for trouble since in all cases the gear does move, causing an increased drag because of disrupted airflow. And how about the disruption of airflow caused by those big landing gear doors which are opening and closing during gear retraction in some aircraft?

In spite of the hazards of increased drag mentioned above, there exists the additional hazard of one or both engines losing power on liftoff. Assuming you have lifted off one of those long runways available at most naval air stations nowadays, there is a good chance of relanding the aircraft with minimum damage – if you have not raised the gear prematurely. ◄

Even science fiction acknowledges the importance of air (or space) safety. But despite the myriad of "black boxes" that man designs to relieve his own burden, he hasn't yet designed one to think and act when the black boxes let him down. Project yourself just a bit into the future, and see what happens one day in our own century . . .

The Day the Airlines Were Four Minutes Late

by LCDR Jack O'Donnell, USNR

THE metallic voice from the console seemed to fill the small control room.

"PATINA New York, this is Scandia Jet Flight Three Zero One. I request an audio read back and change in flight plan, over."

Hartnet, the duty controller, turned to the flight plan monitor screen and read off the information into the microphone. "Three Zero One, this is PATINA New York, flight plan follows; set course zero seven two for London, cruise altitude six three thousand, printed approach six three mike, right-hand turns, runway one three left. Touchdown time zero one five eight and one-half zulu. The time now one niner five seven romeo, enroute time three hours, one minute, weather and winds information on screen two, over."

The pilot repeated the instructions, then added, "I request an approach to runway one three right at London, possible."

A frown creased Hartnet's lined features. "Unable to grant your request," he answered, "Lufthanza Flight Four Two Eight from Brussels is scheduled to touch down on that runway at zero one five niner. You

wouldn't be clear, that's why you have been assigned the left runway, over."

"Roger, thank you," the voice sounded disappointed, "I was just trying to save taxi time. All navigation gyros are up to speed, instrument and power lights green, over."

Hartnet turned to the console and pressed a button, watched a green light come on and then said, "You're locked on the takeoff and departure control gear. Will monitor your departure on low and middle scale. Have a good trip."

While this exchange between Hartnet and the pilot had been taking place, Ralph Snead, the oncoming controller, had entered and stood by listening. Now both men turned to the left wall where a plan view of the field glowed in the semidarkness. A miniature aircraft began to move down one of the runways. They watched it become airborne, turn to a heading of 072 degrees and start to climb. Precisely three hours and one minute from now it would touch down on runway one three left at London Airport, guided unerringly by the inertial navigation gyros in the aircraft and landed exactly on schedule by the electronic gear in a room in London similar to this one in New York. Hartnet swung around to the control console, leaned back in his swivel chair and lit a cigarette. "Have a smoke, Ralph?" he asked, offering the pack.

"No, thank you," the other answered. "Smoking makes me nervous, and I guess I'm nervous enough for one evening right now."

"Nervous, what about?" Hartnet asked, eyeing the younger man.

"Well, when I walked in you were actually talking to a pilot," Ralph gave a small dry laugh, "you know as well as I do that we're forbidden to give audios except in an emergency. And I've yet to see an emergency that DINA couldn't handle. I've always considered it a waste of time talking to airplane drivers."

Hartnet started to answer, then checked himself. Snead was right, he was always losing 15 or 20 seconds in talking to an airliner or military pilot when all he had to do was switch to automatic monitor and the machine would give the answers. He looked affectionately at the big computer. DINA, she was called, her formal name being Digital Integral Navigation Aid. Precision flights anywhere in the world were made possible by the data stored in this computer's memory. She checked the performance figures, gross weight, fuel requirements, etc. of every aircraft requesting clearance, compared these figures with data from thousands of flights along the same routes, then combined this information with enroute traffic and weather information gathered from automatic ground and satellite stations. The data was then relayed to the PAT (Printed Approach Tape) station at the destination and an electronic tape letdown plate was selected for that particular aircraft. The combined systems were known as PATINA (Printed Approach Tape Integral Navigation Aid).

You can't teach an old dog new tricks, Hartnet thought. His controlling days went back to the time when the only way to get them down safely was to talk them down. When you sweated them in, your eyes straining to pick up the tiny radar target which meant that somewhere out there in the fog and rain and night a pilot and crew were depending on you to get them down safely. You felt like you'd done something, when you brought them in like that. That's why he felt a closer kinship to the boys in the cockpit than Snead did. Snead hadn't broken in until the PATINA system had been established all over the world.

You couldn't blame Snead too much. He had been taught that the machine was capable of handling any situation. The public must be served and the public expected airline operations to be on time to the second. How easy it is to forget the men who made this possible, Hartnet thought, his fingers circling the glass paperweight on his desk. Imbedded in the glass was a photograph of a smiling aviator in an old fashioned full pressure suit. The legend engraved around the edge read "Commander Kirk Conway USN, Pilot of Douglas A-12D Bureau No. 505689 – First Non-Stop Flight Around the World Using PATINA System – May 30, 1985." A manufacturer of one of the system's components had given them out as souvenirs after that great flight.

Hartnet put the paperweight down and pushed himself away from the console. "She's all yours, Ralph," he said. "Monitor screen is set on low, automatic takeoff and land system operating and she's purring like a kitten." He got up and walked over to peer out into the night. Rain whipped against the glass in horizontal sheets. A night like this would have spelled real trouble in the old days, he thought, turning away.

He was almost to the door when it happened. The steady hum and clicking of the huge computer changed to a series of high pitched beeps. Hartnet wheeled around to the monitor screen, his eyes seeking the blinking red light that meant trouble.

Snead, at the console, had swung around also and was already busy switching from one scale to the next. They both saw it when he switched to high scale, a pulsing red light, indicating that a high flying aircraft was in trouble.

"Pinpoint that position," Hartnet said cooly, "I'll check DINA and find out what the trouble is."

While Snead manipulated two bearing dials, Hartnet pressed the "Identify" and "Transmit Monitor" buttons

'I'm over that hole, but I don't see any lights. I guess I'm lost after all. Got any suggestions?'

on the computer. In this way he would get the plane's identity and all transmissions from it would be fed directly to the computer and corrective measures begun automatically. In seconds a printed tape began clicking from the machine. Hartnet seized it and read aloud, "Aircraft call sign Navy Rocket 810785; Type F-15J 'Sundagger'; Pilot R. B. White, LTJG USN; Departed USS Forrestal, Position 78 miles bearing 280 from Oahu, Hawaii, Destination USS Defender, Position 65 miles bearing 035 from Norfolk, Va.; routine PATINA flight plan – not holding the assigned course or altitude – no response to warning light – appears navigation gear inoperative –"

"You got his position yet?" Hartnet asked with quiet urgency.

"Right now he's just south of Buffalo, at eighty-two thousand," Snead answered. "He keeps changing course so often he's hard to follow. The pilot must be unconscious or he would have called before this. Looks like we're too late to help. We'd better hit the 'Emergency Eject' button and get him out of it."

That was about all they could do now. Press the button and let DINA take over. She'd save the pilot, but not the plane. And if it hit in a populated area –

"I'm going to give him one call first," Hartnet said, grabbing the microphone before Snead could argue.

"Navy Rocket Zero Seven Eight Five, this is PATINA New York, do you read me, over?"

Silence. The hum of the electric clock seemed to grow more intense as they waited. A minute went by and then Hartnet called again. Still no answer. Hartnet's hand moved across the console, broke the safety wire and lifted the red cover on the eject button.

"Station calling Zero Seven Eight Five say again your message, over."

The voice from the receiver brought the men bolt upright. Hartnet seized the mike again. "Navy Seven Eight Five, this is PATINA New York, what is the nature of your emergency? We are standing by to render assistance, over."

"I didn't declare any emergency," the voice sounded irritated, "Nothing wrong up here I can't handle."

"The monitor screen holds you off course and altitude, is your navigational gear inoperative?"

"Affirmative," the voice came back, "it wasn't working properly so I turned it off."

"Did you get a malfunction light?" Hartnet asked the unseen voice.

"Negative," the irritation was back again, "the radar mapping scope showed me on course over St. Louis, but I positively identified the city as Memphis through a hole in the overcast. I know that area like the back of my hand. There is another hole to the north of my position. I expect to be oriented again in a few minutes. Will call you then, out."

The two men stared at each other in disbelief. It couldn't be true. Not in this day and age! Snead finally spoke. "Of all the stupid, idiotic things I ever heard, this is the worst!" His hand reached for the eject button; Hartnet grabbed the hand and pulled it away.

"What are you going to do?" Snead asked incredulously, "you know we can't get him down through the local traffic and even if he turns his nav gear on again, he hasn't got enough fuel to stay airborne while DINA works out a descent from his present position. It's too late to do anything, I tell you!"

Hartnet's eyes shot from the monitor screen to the wall clock. The monitor tape showed five minutes of fuel remaining in Rocket 0785, altitude 72 thousand, descending. Suddenly his gaze stopped on the round paperweight. There was just a chance in a thousand his idea might work. 0785's voice came in again.

"PATINA New York, I'm over that hole, but I don't see any lights. I guess I'm lost after all. Got any suggestions?"

"Keep him talking," Hartnet ordered, "get radio and radar bearings, vector him toward Floyd Bennet Air Station and start him down. He's clear of all traffic till he hits fifty thousand."

Hurrying to the back of the machine he hastily removed the metal cover and began to study the wiring diagrams and electric circuits of the complex computer. Beads of perspiration stood out on his forehead as he traced the wiring to the automatic monitor and transmit control boxes.

"Baby," he breathed, "we've never asked you to do anything like this before. When I give the word – please don't fail me!" Then wiring the automatic monitor to transmit control, he murmured a short prayer and returned to the console where Snead was talking to 0785.

"What's his position now, Ralph?"

"Passing through sixty thousand vectoring 205 for Floyd Bennet," Snead's voice was close to panic, "he'll never make it!"

"Keep a radio bearing on him, I'm going to shift to low scale on the monitor screen for a minute."

The low scale showed one aircraft on final in the local

area and two commencing final approaches at five and seven thousand. It was now or never.

Carefully Hartnet placed the glass paperweight on a notepad and used it to trace a circle. Then he turned to the console where the printed approach plates were stacked like records in a juke box. He waited till the aircraft on final had touched down, then quickly seized the stack of approach plates, pulled them off the rack and dropped the notepad in the slot. Into the microphone he said, "All aircraft under PATINA New York control – left hand orbit – four minute circle – present altitude – this is an emergency – repeat emergency!"

In the tiny room all hell broke loose. DINA let out a roar like a stricken lioness. Circuit breakers popped, fuses sizzled, warning bells clanged and red lights began blinking all over the console. Snead croaked a terrified "Oh my God!"

"Keep talking that plane down!" Hartnet shouted above the din. "This baby will be all right if you give her a minute to get over the shock."

In a matter of seconds the noise subsided. DINA settled down to a quiet, if somewhat labored grinding, and the red lights blinked out one by one. The monitor screen showed each aircraft in a precise orbit of one and a half degrees per second. The lead pencil circle on the notepad was acting as a precision pattern for all planes but one, Navy Rocket 0785. It was being controlled by radio alone.

"Switch to mid scale, Ralph, we have less than four minutes to get him down."

But Snead was beyond reacting. His eyes stared fixedly at the huge computer, his face the color of putty. Hartnet grabbed the mike and flicked the radar screen to mid scale. The solitary dot moving in the pattern of circling aircraft was passing through fifty-six thousand.

"Navy Zero Seven Eight Five, this is PATINA New York, do not attempt to acknowledge further transmissions. Imperative you answer all heading and altitude changes immediately. Am attempting to bring you down through all local traffic for a landing at NAS New York. Turn left to one niner zero, increase rate of descent to sixteen thousand feet per minute . . . "

It was like playing a live pinball machine. The moving dot of light was maneuvered around, over and under the circling traffic. Weaving in and out like a drop of quicksilver, the light descended the scale. At twenty thousand Hartnet switched to low scale. Eighteen . . . sixteen . . . now twelve thousand went by.

A wrapped up turn at eight thousand put the fighter clear of heavy traffic and at four he was clear of the last two circles. Hartnet gave instructions to reduce speed and go through the landing checkoff list, watched the dot slow down and eased it around for a straight-in approach. The moving dot passed over the threshold of the runway and the touchdown light came on. Hartnet's eyes darted to the wall clock.

Four minutes, right on the nose.

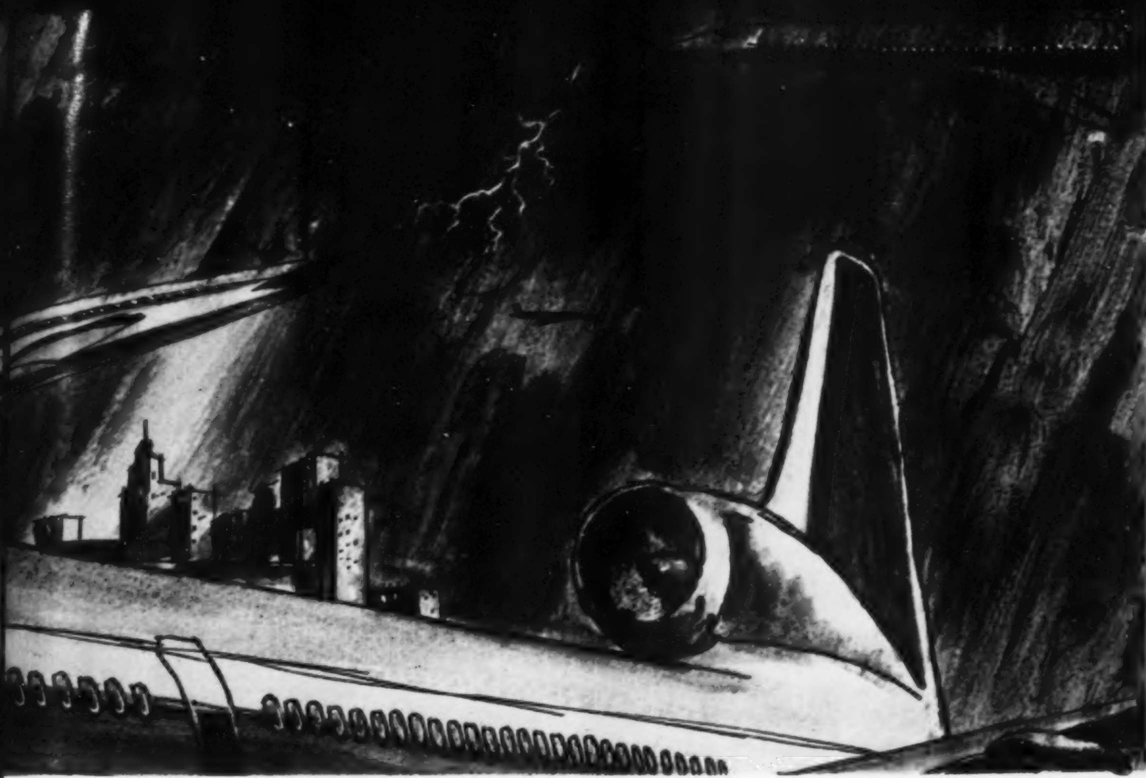
Quickly he pulled the notepad from the machine and dropped the stack of approach tape cards back in their holder. DINA resumed her normal pleasant clicking, purring sound. It was all over. He felt completely exhausted as he leaned against the console, the sudden release of tension nearly buckling his knees.

"Do you realize what you've done?"

The voice at his elbow was a whisper, breathless and shaking, like a man awakened from a terrible nightmare.

"You've put every airliner in the New York area *four minutes late!*" Snead's voice rose to a shriek. "Do you have any idea what that will cost the airlines? How many people are going to sue? It will run into billions! And it happened while I had control," the voice broke in a sob.

"I took control away from you, remember?" Hartnet said, not bothering to turn around. "You had nothing to do with what happened."



"That's right, you did take control!" Snead couldn't conceal the note of relief that replaced the whine of despair. "I wanted to press the button, but you wouldn't let me. I've told you before that you'd get in trouble talking to pilots. What would happen if we lost four minutes every time some lunkhead fouled up? And you know something? I'll bet you that kid doesn't even care what you did for him. I'll bet he's congratulating himself right now on what a hot pilot he is!"

Hartnet wasn't even listening now. Why had he taken the chance he did? He had placed a lot of lives in jeopardy, which still hadn't occurred to Snead, but would certainly not escape the attention of the investigators. Had he done it to gain back the feeling of accomplishment long unfelt? Was it a genuine concern for that one pilot that prompted him to take the risk which could have meant disaster? And which could cost him his job? No use kidding himself about that, he was through. Was he, after all, a misfit, trying to prove that individual thought still had a place in the age of the machine?

One thing he was proud of. He had proven that the computer could take a lot of punishment in stride. DINA was rugged, good men had seen to that. This, he realized, was the only justification he could offer. A court of inquiry would carve that reasoning to ribbons.

Snead's voice again brought him back to the present. "The airlines people and the investigators will be here any minute," he was saying, "and I'm going to have to tell them the truth about what happened. I'm sure you understand I can't tell them something that was a lie and which they would undoubtedly find out and not do either of us any good . . . "

"No, Ralph, you couldn't do that. They'll probably have me come in early tomorrow morning on this, so I'd better be going." Hartnet stood up and walked toward the door.

Snead started to say something else, but the door had already closed, so he stood there, listening to the heavy footsteps descend the stairs of the tower. When they had faded out he hurried over to the desk and began to write his report.

This article is reprinted from the July 1959 issue. PATINA is still a long way off, but the moral is that the best solution to an emergency will always be to admit its presence and ask for assistance; there are more willing, helpful hands than we often realize.

A vote of thanks, also, to the GCA/CCA controllers. As in our story, they often give a happy ending to a story which could be otherwise terminated. – Ed.

SEASIA SAR

BRIGHT red-orange daysmoke from a Mk-13 Mod 0 signal flare seeping through the dense jungle canopy pinpointed a downed A-4 pilot for the SAR helicopter crew. While evading enemy forces, whenever he could, the pilot had used his PRC-63 radio to communicate with Rescap and the SAR helo. The jungle penetrator lowered from the helo sank deep into the brush with the result that the pilot was unable to see the seat paddles or get to them to pull them down. His right hand was burned and he could not open the small zipper on the penetrator case with his left. Finally he gave up and, detaching the penetrator from the hoist, hooked the hoist to his torso harness lift ring. With small arms fire cracking, he was taken aboard. From ejection to rescue the pilot was on the ground an hour and 10 minutes. Although an accident report was not required by OPNAVINST 3750.6F, the squadron submitted one to provide useful information on a unique SAR incident during combat operations in Southeast Asia.

The pilot launched on a four-plane armed road reconnaissance flight in the late afternoon. The flight was briefed to divide into two sections for separate routes. The pilot in this narrative was wingman for a flight leader under training. They coasted in shortly after

the area was cleared from a MIG call. As the flight approached an area of known AAA they began a hard turn to the west.

"I was under the impression that my flight leader was taking some fire," the pilot recalls. "I didn't see any tracers but I just had the feeling, perhaps from something I saw out of the corner of my eye. I didn't say anything on the air since I thought it was probably my imagination but just as we had turned about 90 degrees and were heading roughly west I took a hit. I knew immediately that the aircraft had had it. There was a series of explosions and a fire warning light.

"The plane went into an uncontrollable roll to the right and I was under the impression that the wings or ailerons had been damaged as well. The plane was virtually out of control with no apparent effect from stick or rudder movement. At that point, I disconnected the flight controls and regained partial control. With full left stick and judicious rudder, I was able to keep the plane in roughly level flight. I picked up a heading toward the west to the ridges across the river. During this time frame I also retarded the throttle and the explosions from the engine ceased."

In his endorsement to the final report, the squadron

commanding officer stated that the additional seconds of controlled flight which were apparently achieved as a result of the pilot disconnecting the hydraulic flight controls made the difference between rescue and immediate capture. "It is strongly recommended," he wrote, "that A-4 pilots continue to be indoctrinated in the utility of the flight control disconnect and that all A-4 pilots receive one flight using manual flight controls." Subsequent endorsers concurred.

The pilot continued in a westerly direction in an attempt to make it to the hills before ejecting. During this time he transmitted that he had been hit and jettisoned the ordnance from the aircraft. Smelling smoke in his oxygen, he disconnected his mask on the left side. The engine had continued decelerating and would no longer respond to the throttle. He noticed the light indicating a utility hydraulic failure and may also have had a flight control hydraulic failure light. He lost all electrical equipment and although he dropped the RAT, he did not regain any of the electrical systems.

"The plane was losing altitude and decelerating. I tried to add power again without success," the pilot recalls. "I believe the engine just stopped after the explosions ceased. I was able to keep the plane heading west and I crossed the river heading for the ridges. As the airspeed decayed I wasn't able to hold the plane under control and it started a roll off on the starboard wing. I almost ejected at that point but decided to let it complete the roll to wings level again. It ended up in a nose down attitude of about 60 degrees and, judging my altitude to be as low as I cared to take it, I ejected at an estimated 2000 ft. I knew I had gotten to the beginning of the ridges but not as far as I wanted. I used the alternate ejection handle and still had my right hand on the stick.

"The ejection sequence was extremely rapid," the pilot continues. "I can remember the canopy blowing off, the rocket lighting off and my right arm flailing around in the windstream. I felt seat separation and then the chute opening. I could see the seat falling away but I didn't see the aircraft impact.

"Although I was somewhat dazed I noticed that my right glove was missing and that the velcro patch pocket holding the pencil flares had torn loose. Other than that, everything was in place and I reached up and disconnected my oxygen mask and let it fall. I then got out one of my PRC 63 survival radios and turned on the beeper. I saw I was about to land so I turned it off and put it away again.

"I could see where I was going to land but I didn't seem to be coming down too rapidly and the chute wasn't oscillating. I crossed my arms over my face and crossed my legs, penetrated through the jungle canopy and impacted on the ground. I was somewhat stunned but the landing wasn't particularly hard and the chute was caught up in the trees. I reached up and pulled my visor and disconnected the koch fittings and then the rocket jet fittings on the seat pan without any trouble. I saw for the first time that my right hand was burned. I guessed it had come from the rocket motor on the seat. I pulled off my helmet and noticed that the back pad was bloodied, from a laceration on the back of my head. Apparently, I had hit a tree on the way down. My face felt raw – I had picked up some cuts coming through the trees as well.

"I opened up the seat pan and pulled out the survival kit and then I got the radio out and established voice contact with two F-8s which I could see orbiting overhead. I told them I was all right and was going to head west. I took out my compass and gathered up my hard hat and survival kit and headed out.

"I had landed on the slope of a ridge in fairly thick jungle. The ridge sloped to the south and ran roughly west in front of me with the ridge line to my right and the river or valley to my left. I estimated I was about half-way up the slope but had no way of knowing since I couldn't see beyond about 15 ft. No terrain features or landmarks were visible due to the thickness of the vegetation.

"As I headed west the jungle thickened a great deal. The only way I was able to move was on my hands and knees for the most part through little animal trails. These were like tunnels 3 ft or so in width and height. I went as fast and as far as I could initially to get separated from where I had left the chute. I was wringing wet with perspiration and this method of travel was extremely exhausting.

"When I stopped again – I estimate after about 10 minutes – I got out the radio and established voice contact with the Rescap flight now overhead. He told me that it looked good enough to get a helo in and that they were arranging for one. He said for me to try to get to an open spot about 270 degrees from where I had landed – about 200 yds, I believe, was the distance. I still had my hard hat with me and debated at that point whether to get rid of it but I decided to keep it for the helo pick up. I moved on toward the west.

"The jungle at this point was very dense and I couldn't see the sky in the gloom. It was thick with underbrush, decayed vegetation, insects and what have you. After crawling perhaps five minutes I would become exhausted and would have to stop and rest. At the second or third stop I got out my water bottle. I drank about half of the water and felt much better. At some time during one of these rests I began to hear voices behind me, back where I judged I had left the

The jungle was thick with underbrush, decayed vegetation and insects.

chute. I stopped at that point and hid myself in the thickest cover I could find.

"I called up the Rescap on the radio and told him I heard people. At that time he saw them pulling down my chute and we agreed that he should put some ordnance down. The A-4s and F-8s made a total of about four passes. The noise, concussion and shock made me feel that I was right in the middle of the impact area but I knew it was well to the east of my position.

"At this point I decided to get rid of the hard hat since it was covered with reflective tape and I felt it could be seen too easily if there were people in the area. I stuffed it in a stand of brush and covered it all over with leaves and dead vegetation from the surrounding area.

"I had been thrashing around without much regard to noise before but at this point I became much more cautious. I moved on and then I heard another group of people. I took cover again in the thickest hole I could find. These people were below me to the south and were calling, 'Hey, Joe!' or 'Hey, Joe! Come down!' and then they would fire a rifle. I just held my breath and didn't move. They seemed to pass by to the west and I didn't hear them again. About this time I heard a strange noise above me on the ridge line to the north. There were people up there too but they seemed to have an electrical generator or something that sounded like one. I took it to be that they had a radio up there and they were trying to monitor my radio but that's just a guess. At any rate I didn't move or use my radio until I heard them pass by to the west as well. After I was sure they had gotten out of range I called up Rescap again and they told me the helo was inbound and to try to get to a clear area. I moved on west going up a little higher on the ridge and eventually, after several rest stops, I broke out of the really thick jungle into a bamboo stand with just a few trees here and there. I had about reached

the limits of my endurance at this point and it looked to me as if this would be good enough to make the pick up.

"Some time during this travel I became aware that I'd injured my leg and it wouldn't hold up under my weight very well. However, I was crawling for the most part and it didn't seem to make too much difference at that point. I'd been on the ground about 45 minutes and had only gone perhaps 100 to 200 yds and had consumed just about all the water I had in my survival vest. I still had some canned water in the other survival container which I had taken from the seat pack. I had considered stopping and bandaging my burned hand but decided to get to a pick-up spot first. Somewhere along the route I had seen evidence that people had been there before. There were places where bamboo had been cut off with a knife and a crude lean-to shelter built.

"Each time I had stopped I had used the radio to find out what the situation was. It functioned perfectly. I had the volume turned all the way down so as not to alert any people who might be around. When I decided to stop in the bamboo grove I got out a smoke flare and had that ready to signal the helo. I called up Rescap again and told them I was in a fairly clear area. The helo was very near already and the Rescap flew over me once, homing in on the beeper and I gave them an 'on top.' I fired off the smoke flare then and just stood there waiting to see if I could spot the helo and vector him in. The smoke didn't penetrate the jungle canopy too well but enough seeped through and the helo came in and hovered. I spotted him on his approach and gave him a slight vector to get him right on top." (The helo pilot later reported that the survivor did an excellent job of calling the helo over him.)

"The rotor blast blew down enough of the bamboo so that I could see the helo clearly. The crewman spotted me, I think, and let down the jungle penetrator. *(The helo crew could now see the pilot's head in plain view. – Ed.)* It landed about 6 ft away and it was all I could do to pull and claw my way over to it through the vegetation. The penetrator had sunk down into the brush and I couldn't see the seat paddles or get to them to pull them down so I tried to open up the pouch on top with the lanyard but I couldn't get that unzipped. Finally, I just unhooked the penetrator from the hoist and hooked it on the D-ring on my torso harness. During the whole interval I could hear people shooting. I was attempting to get aboard the helo as fast as possible but it seemed an eternity."

The helo pilot later stated that they were in a hover about three minutes and that they received small arms rounds through the aft fuel cell, cabin deck, port fuselage skin and No. 2 main rotor blade. The self-sealing cell worked satisfactorily. The helo copilot fired an M-16 at several people on the ground as the helo broke hover but the helo pilot had to stop him because the empty cases were bouncing off the windscreen into his face. Both crewmen were firing M-60's throughout the rescue.

"I was physically exhausted at that point and just sat there trying to make myself realize I was safe," the survivor continues. "After a few minutes they gave me some brandy and I started to recover somewhat. I moved over and sat down in the one seat and just watched in a sort of detached manner.

"We were coming back out south of the hills generally on an easterly course. I could see the 37 mm. sites open up on us but as soon as they did there was an A-4 there to suppress flak and we didn't take any hits on the way out. After what seemed like hours we were feet wet and landed aboard the southern SAR destroyer and I was taken down to sick bay and patched up."

Communications during the rescue operations were very cluttered until the helo came under the direct control of the on scene commander, the helo pilot noted. The on scene commander switched the helo to guard and everyone else to SAR primary. At this time the on scene commander and the downed pilot were the only ones on guard and communications were excellent.

Summarizing the rescue mission the helo pilot wrote, "The success of this mission can best be attributed to the state of readiness the SAR posture is continually in, the fast reactions of the on scene commander, the Rescap and the coordination of the southern SAR destroyer. The high degree of courage and professionalism exhibited by my crewmen and copilot were without exception."

Here are the investigating flight surgeon's comments:

- The pilot highly recommends that every combat pilot be in peak physical condition to be able to withstand the extreme physical demands of endurance and strength required by even a short escape and evasion situation such as his own.
- The value of a ready supply of drinking water during an escape and evasion situation cannot be overstressed. It should become a standard part of every combat pilot's flight gear. A pint of water has extraordinary physiological and psychological significance in the early moments of any survival situation.

Since an accident report was not technically required in this instance, the board did not make any recommendations. However, the board did express the opinion that the pilot's decision to disconnect the hydraulic flight controls and to stay with the aircraft until the last possible moment probably saved him from capture.

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IN a recent cockpit fire in an A-4 awaiting clearance to take the runway, the pilot was severely burned. *His injuries would have been considerably reduced and perhaps prevented altogether if he had been wearing the required fire protective survival clothing.* He was wearing a cotton flight suit instead of the approved nomex flight suit required and he was not wearing gloves although he had them with him. Because first degree burns of his hands slowed his escape, he suffered additional burns over 60 percent of his body.

Gloves: General NATOPS states that pilots and aircrewmen shall wear gloves to protect their hands from possible flash burns. The only exception is that gloves may be removed on low level overwater flights and launch or recovery operations aboard ship.

The new nomex/leather summer flight glove (FSN 9D8415-935-6328 series) is the *only* glove authorized for wear by all Navy and Marine Corps pilots and crewmembers. (Naval Air Systems Command message 132229Z of June 1969 refers.) This glove replaces the Navy all-leather type B3A glove and the interim Air Force HAU-7/P or simplex glove. The Navy nomex/leather summer flight glove has also been adopted as the one standard issue by both the Army and the Air Force.

This new glove represents the latest state of the art. The leather portion is the softest non-slip and washable type of sheepskin commercially available that meets protective requirements. The specially knitted nomex fabric back is the best fire-resistant material currently available. NavAirSysCom advises that as more highly fire-resistant material developments become available commercially they will be investigated and evaluated. Should any discrepancy in design, materials or manufacture of the nomex/leather summer flight glove – or, indeed, any other piece of survival equipment – be discovered, it should be specifically identified and reported by UR in accordance with NavAir instructions.

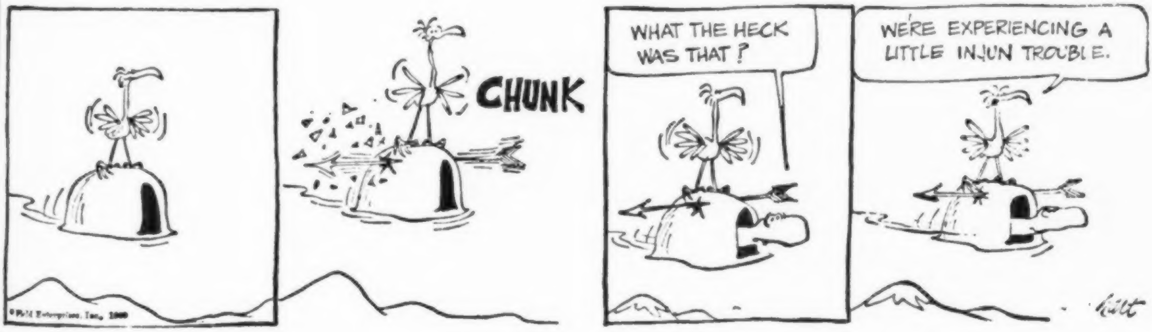
Flight suit: General NATOPS states that "the fire retardant flight suit shall be worn by all crewmembers and passengers in combatant aircraft and single engine training aircraft and is encouraged in all other Navy aircraft." The nomex flight suit is now the single standard summer coverall for *all* personnel assigned to flying duty. (NavAirSysCom msg 112212Z of July 69 refers. This message further directed that cotton coveralls no longer be issued to or used by aircrewmen.)

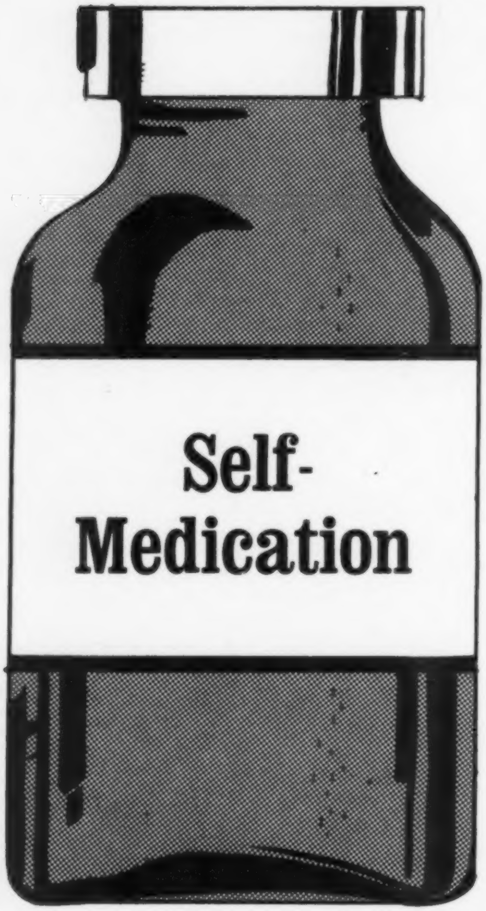
The nomex flight suit, now generally available, is a great improvement in fire protection. Nomex is a high temperature resistant and inherently flame retardant fabric with no hot melt or drip characteristics. It will not support combustion but will begin to char at 700 to 800°F. Because the fire retardancy is inherent in the nomex fiber itself, the suit can be washed as often as necessary without compromising its fire protection. (Please see Air Crew Systems Bulletin 127 for laundering information.) It requires no renewable flame retardant treatment as did the cotton flight suit. Nomex is lightweight and the fabric is tough. However, like other synthetic fabrics, it is non-absorbent and, for this reason, cotton underwear should be worn for maximum comfort.

For maximum protection against fire, the sleeves of the nomex flight suit must be worn *down* and *closed at the wrists.*

The nomex/leather flight glove and the nomex flight suit offer first class fire protection. Wearing them is just good common sense.

B. C. **by Johnny Hart**





WHEN OG, Son of Fire, had a stomachache from a tough chunk of brontosaurus or excedrin-headache-number-16 from listening to his mate's expressions of boundless admiration for the new cave development up the mountain, he probably attributed his miseries to evil spirits and endured them until better times. We're different today. Stomachaches and headaches and all the other slings and arrows of outrageous fortune are still the plague of man but stoic suffering has gone out of style. This is the era of the capsule, elixir, powder and pill and what you don't know about over-the-counter medication you can easily pick up in one evening of TV.

The upshot of this abundance of availability and knowledge is that medicine cabinets bulge and people very often doctor themselves. If you're a retired beekeeper or a surfboard waxer, no sweat. Not so if you happen to be one of Uncle's airmen. The subject, gentlemen, is self-medication.

Drug Hazards

Somewhere on your friendly flight surgeon's bookshelf, perhaps between Armstrong's *Aerospace Medicine* and the *Naval Flight Surgeon's Manual*, you may see a paperback book called *Guide to Drug Hazards in Aviation Medicine* put out by the Aviation Medical Service of the FAA. This little volume lists some 2000 drugs along with their undesirable effects to aviation personnel and, based on customary or usual dosage, the period during which duties involving flying are inadvisable.

If you have any questions on specific drugs, your flight surgeon will be glad to look them up for you in this book. Meanwhile, here is a short rundown on some classes of drugs which are easily available and likely to be used without medical supervision and which, therefore, are of particular concern in aviation.

Antihistamines: While anthihistamines and drugs having antihistamines in them have no adverse effect on some persons, others experience drowsiness (except for one particular antihistamine which has the opposite effect – excitement), dizziness, dry mouth, headache, nausea, muscular twitching and in rare cases a highly elevated temperature. The drowsiness can be especially hazardous because it may not be recognized and may recur after apparent alertness. In addition, the *Flight Surgeon's Manual* states that drugs containing antihistamines can also affect your depth perception, the operation of your inner ear and your perceptual-motor skills.

Antibiotics and sulfa drugs: Usually any pilot or crewman taking an antibiotic is under a flight surgeon's supervision. However, it doesn't stretch the imagination too much to picture someone, who for one reason or another doesn't make it to sick call, taking an antibiotic prescribed by a civilian physician who is unfamiliar with the hazards peculiar to aviation. Aviators have also been known to take medication left over from a previous illness or even borrowed from a friend. *This is not recommended.* You may be taking the wrong pill and you may even be doing your bugs a favor by playing Darwin and killing off the weak and leaving the strong.

The undesirable effects of antibiotics, as far as aviation is concerned, vary. Penicillin, for instance, can produce early or late allergic reactions including asthma (a most unpleasant condition at altitude). The tetracyclines can cause nausea, vomiting, diarrhea, light-headedness and photosensitivity.

Streptomycins can produce nausea, vomiting and dizziness. If your illness is severe enough to require antibiotics it is most likely a good cause for grounding. Get your flight surgeon's advice!

Barbiturates: Barbiturates often produce excitement initially, then sleepiness, sedation and impairment of mental and physical activity. The person taking the drug is often not adequately aware of the minor sedation which exists during his recovery from it, a condition sometimes referred to as drug hangover.

Antispasmodics: Antispasmodics can produce dilated pupils and paralyzed accommodation, dry mouth and difficulty in urination. They can also precipitate glaucoma.

Tranquilizers: Tranquilizers and aviation don't mix but, just for the record, here are some of the adverse effects produced by these drugs. Your flight surgeon can identify these drug groups by trade names for you. The phenothiazine group of tranquilizers can cause weakness, chilliness, constipation, stuffy nose, blurred vision, dry mouth and low blood pressure. This group can also affect the central nervous system and cause internal organ damage. The propanediol-carbamate group may cause tremulousness, muscle relaxation, sleepiness, nausea, depression, allergic reactions, intolerance to alcohol and withdrawal symptoms as well as certain blood changes.

Chlordiazepoxide can cause drowsiness, vertigo, ataxia or muscular incoordination (in doses over 50 mg. per day), syncope or sudden loss of strength or temporary loss of consciousness, itching, dermatitis, confusion and impaired thinking. As the *Flight Surgeon's Manual* points out, "A certain amount of anxiety and awareness has a definite physiological benefit in a stressful situation. For this reason tranquilizers may be quite dangerous when used in an aviation environment. A pilot should be able to appreciate, both rationally and emotionally, the risks of a particular course of action. Psychological testing indicates that use of tranquilizers may produce highly significant alterations of judgment and orientation to reality. Airmen should be removed from a flying status while using tranquilizers. It also may be advisable to continue the period of grounding for some time following the cessation of use."

Antimalarial drugs: The *Flight Surgeon's Manual* states that there is no evidence that chloroquine and primaquine have sufficient toxicity in recommended dosages to contraindicate their being administered to flying personnel under appropriate conditions. However, there are reports that antimalarial drugs may cause visual difficulties. For this reason, if you are taking these drugs you should report any symptoms to your flight surgeon.

Self-medication can be a hazard in aviation because of the effects produced by the drugs taken. It can also, on occasion, mask a serious medical condition which should have immediate specific medical treatment. An extreme case of this came to light in the investigation of a fatal accident a year or so ago. The pilot had been taking commercial cold capsules containing antihistamine. The autopsy revealed that he had advanced tuberculosis. He had not reported his symptoms to the flight surgeon.

When you don't feel up to par, the man for you to see is your flight surgeon. Civilian physicians are excellent and well-trained but relatively few of them are aware of all of the medical problems peculiar to aviation.

And under no circumstances should you *ever* take a medicine originally prescribed for a member of your family or a friend – accept sympathy and flowers, but never old prescriptions.

Self-medication is a potentially hazardous undertaking at best. In aviation it can endanger others as well as yourself. Flying and medication – *especially* medication which is not directed and monitored by a flight surgeon – do not mix. ◄

Aircrew Self-Medication

Self-medication by aircrew personnel is strongly discouraged. Almost any drug or pill can at times produce untoward reaction or impair the coordination and concentration required in flight. Within *12 hours* prior to flight, aviators should take no medication unless approved or prescribed by the flight surgeon. Flight surgeons shall indicate necessary flight limitations on all prescriptions provided to flying personnel. Medicines such as antihistamines, antibiotics, tranquilizers or sleeping pills, obtained during an acute illness should be discarded if not all used during the period of medication. Sustained medication should be strictly supervised by the flight surgeon who shall make appropriate health record entries.

General NATOPS
OpNavInst 3710.7D.

notes from your flight surgeon

Wrong Procedures

INVESTIGATORS of a TF-9J overland accident were of the opinion that ejection procedures employed by both instructor pilot and student aviator were in error. However, they stated that considering aircraft speed (.94 mach) and lack of pilot control (an 80-degree dive), his decision to eject was the only thing that saved their lives – a few seconds' delay might have been fatal. As it was the student was severely injured.

The pilot, who was in the back seat, had briefed that he would eject first should the need arise. After telling the student to eject, he reached for the face curtain with his right hand and the seat pan firing handle with his left, pulling both handles at the same time. The seat pan handle fired the seat. (The TF-9J NATOPS says the primary means of escape is to eject through the canopy by means of the face curtain. If the seat fails to eject then pull up on the secondary firing handle. "Hold the face curtain handle with the left hand and grasp the secondary firing handle with the right hand. While holding the face curtain handle, pull up secondary firing handle smartly with free hand.")

At the time of ejection the pilot had his seat full up, his helmet chin strap quite loose, his visor down 3/4 in and his feet flat on the cockpit floor instead of on the rudder pedals. As the seat started its travel up the rail, his right foot contacted some portion of the cockpit or canopy, ripping the steel toe cap off. In spite of this his foot was uninjured.

On entry into the airstream, the pilot lost all the survival equipment on his flight clothing. The face curtain was not far enough forward to protect his face from windblast and shortly after ejection, tore free. His kneeboard broke away and his helmet, which had a loose nape strap and a loose chin strap, was torn off along with the oxygen mask.

On hearing the pilot's seat fire, the student pulled his face curtain. At the time of ejection he was fully prepared but had intentionally pulled his legs back next to the seat with his feet flat on the cockpit floor. He did not remember that his feet should remain forward on the rudder pedals, heels on the deck. He, too, lost his survival equipment, kneeboard, oxygen mask and helmet – the latter in spite of a tight chin strap and snug nape strap. Judging from the student's lack of facial injury, investigators were of the opinion that the face curtain and helmet stayed with him until he had decelerated somewhat.

The ejection procedures employed by both pilots were in error, investigators stated. The pilot's broken shoulder and facial injuries could have been prevented by placing both hands on the ejection face curtain vice one hand there and the other on the secondary firing handle (the latter method to be used only if the seat fails to eject by the primary means – the face curtain.) Furthermore, his near loss of toes can be attributed to his feet being back on the deck instead of on the rudder pedals. The student positioned his legs back, feet on the deck against the ejection seat. This incorrect procedure could possibly have caused the two broken legs that he acquired some time during the ejection sequence.

The injured men were fortunate that a number of civilian pilots, including a doctor, were at an airport two miles from the crash site and saw their ejections. One of the civilian pilots took off in his aircraft, located the survivors and by dipping down over the treetops directed the doctor in his car to the landing site.

"The location and rescue of both pilots were greatly enhanced by the fact that their ejection and parachute descents were witnessed by (these) alert and levelheaded civilian pilots," the investigating flight surgeon reports. "The student aviator's survival of this accident was in a large part due to his rapid location and rescue by a very competent civilian doctor who began the appropriate and probably lifesaving treatment of his profound shock."

The flight surgeon recommended:

- Reemphasis of ejection techniques stressing the importance of proper positioning of all parts of the body especially in high speed ejections.

- Using the face curtain for all high speed ejections especially if oxygen equipment may be needed such as in high altitude ejections.

The investigation board recommended that all pilots be reinstructed on the correct ejection procedures and that the quarterly dry run utilizing squadron training seats include emphasis on correct leg positioning.

Voice of Experience

RIO after deck-level ejection following bridle failure on an F-4J catapult launch: "Everything happened fast and I had to react fast. The only reason this was possible was from the large number of survival training drills the Navy requires. Before, I thought there were too many but I don't feel that way anymore and I'll be the first in line anytime they come up."

Left Behind

INVESTIGATION of an E2-A carrier landing accident in which the aircraft successfully bingoed to the beach disclosed that the crew was without a number of required items of personal survival equipment. Lack of survival radios and SEEK-2 kits was due to supply problems, the reporting flight surgeon states, but other items ranging from the 38 cal. pistol and tracer ammunition and the pencil flare gun to flashlights and strobe lights were left behind.

"Vital safety and survival equipment was not available to these people," the flight surgeon writes, "some because of supply problems and some because of their error in leaving it behind. As we near the first line period in the Tonkin Gulf, pilots and crewmembers will be more acutely aware of the importance of flying with the proper equipment and we will be receiving some materials from the carrier we relieve. Maintenance of one's personal gear requires an unending vigil and should be a routine practice when off the coast of California on carquals as well as when flying in the combat zone of Vietnam."

Ambiguity

AMBIGUITY of terminology can be dangerous, especially during an emergency.

The Air Force has reported a fatal ejection in which the pilot used the terminology, "Let's get out of here!" three times during a 15-second period. The rear seat occupant did not realize that the pilot was calling for ejection until after the pilot initiated the ejection sequence (command ejection system). He happened to be in the proper body position at the time and received only minor injuries. However, he could have been in a position where he would have received major injuries in an unexpected ejection.

The pilot in this accident may have delayed his own ejection because of uncertainty as to whether the back seat occupant understood him, investigators theorized. He received fatal injuries because there was not enough time for his parachute to open.

If you are in doubt as to what is expected of you in a specific emergency, better check your NATOPS. And make sure your aircrew knows what to expect also.

approach

Abdul always insists on a thorough preflight.'

Survival Radios

IT HAS been noted that some pilots and aircrewmen are carrying their survival radios in helmet bags or places other than on their persons. In the event of a crash a definite possibility exists that they will not have time to pick up their radios prior to evacuating the aircraft. A recent rescue of an aircrew would probably not have been accomplished if they had misplaced their radios. Recommendation: that pilots and aircrewmen carry their survival radios on their persons.

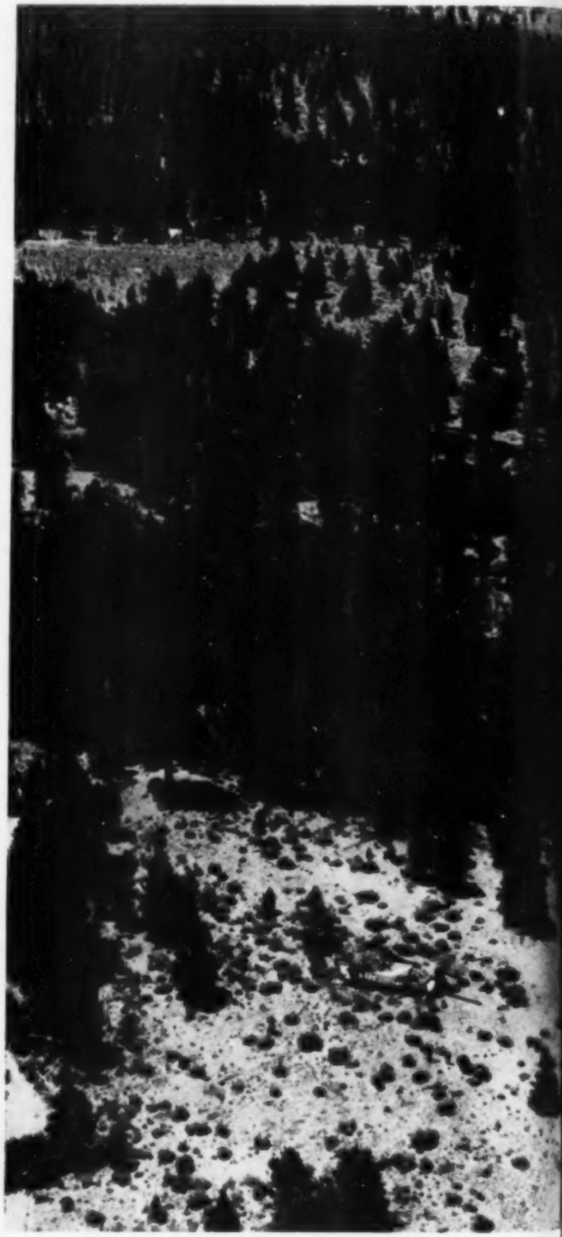
Safety Council

Taboo

A SPECIAL plea goes out to pilots and aircrews to discuss minor as well as major illnesses with their flight surgeon. Self-medication is an extremely dangerous practice. Even nonprescription medicines often have trace amounts of drugs which affect coordination and thinking and are taboo for aviators.

Flight surgeon in MOR

Marine and Navy helicopter pilots in Vietnam frequently must operate in areas of rough terrain. In order to complete a MedEvac mission or insert a load of troops, pilots often operate where conditions are undesirable. Repeated exposure to rough terrain, unsecured or unknown landing areas inevitably results in some kind of damage to the aircraft. Incidents and accidents resulting from many different types of natural hazards are sufficient to fill several volumes of reports.



A UH-1E incurred a large dent in the fuselage and two bent internal ribs when the pilot landed on top of a tree stump, which was hidden by bushes in an unprepared area. In this instance no great damage was done to the helicopter and no one aboard was injured. This is not the case, however, in many such happenings. For instance, a pilot hovering in a UH-34, to disembark a recon team, allowed the helicopter to drift into a hillock. The ensuing upset caused bravo injury to a member of the team and alfa damage to the chopper when it rolled into a ditch and burned. In another instance, a CH-46 helicopter, being backed into a small zone on an internal resupply mission, collided with a stump. The crew chief's long communications cord had stopped working and he was unable to warn the pilot of the hazard. Here damage was slight and no injuries occurred.

Observable Hazards

On many occasions helicopter pilots, even though they can see trees and obstructions, either misjudge distances or do not have signalmen to help them avoid readily apparent dangers. A CH-46 pilot, upon return to his home base, discovered the underside of several aft rotor blade pockets to be split. He had effected two landings in confined areas on a recon insert mission and did not suspect the rotors had contacted trees. The pilot of another CH-46 was making a night landing in a MedEvac zone. In following signals from the zone director his aft rotor blades struck a tree and all three blades had to be replaced. In this case the pilot, while complying with the signals of the zone director, unknowingly maneuvered from a safe area into an unsafe area. The zone director was trying to move the helicopter into a more favorable position for the MedEvac passengers.

External Loads

Even though some helicopters are not going to land, as when bringing in supplies externally, there are some hairy incidents. One CH-46, while on an approach in mountainous terrain with an external load, became too low and allowed his load to strike the mountainside. The load broke loose and the pendant flew up and wrapped around the aft rotor head. This pilot was

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ROUGH TERRAIN HAZARDS AND UNSUITABLE LANDING ZONES

extremely fortunate that a landing area existed and it is to his credit that he was able to land before the helicopter became uncontrollable.

What then are the choices, if any, available to a helicopter pilot whose mission necessitates operating or landing in unprepared areas? It would seem prudent, when circumstances permit, that an inspection of the landing area be made by a crewman. The crewman by virtue of his experience, is far better able to judge rotor clearances, conditions of the ground and other hazards than most zone directors. The crewman can be offloaded while in a hover and in 30 seconds can inspect the landing zone to the pilot's satisfaction. If unable to have a crewman inspect the landing area it seems desirable to use hand signals or use a loud hailer which would direct the signalman, or zone director, to inspect for hazards while being observed by the pilot. For years rescue helicopters have had "Abandon Chutes" or "Remove Chutes" painted on the belly of the aircraft. The dimensions needed for a safe landing zone could easily be painted on the belly of any helicopter.

Exceptions

It is realized that there are many situations which would not permit even as cursory a look as proposed. Certainly no one wants to waste any time having an area inspected when he's being shot at. Frequently, adverse weather conditions will not permit a detailed airborne inspection of the landing area. On many occasions the element of surprise would be lost if a pilot took the time to scout around. In cases like these it seems best to get in and get out as quickly as possible using the best available information to raise the odds in favor of a successful landing.

Final Note

Nothing in this article is meant to deter pilots from the completion of any assigned mission. The purpose is merely to substitute an educated calculated risk, under the right conditions, for an unnecessary risk. In nearly every instance cited in this short article the damage incurred was sufficient to prevent completion of the mission and in a few cases parts had to be lifted in to effect repairs before the damaged helicopter could be flown out. ◄

Autorotation

The May 1969 issue published an article, "Pointy Horns," concerning a general discussion of helicopter flight characteristics in the power-off regime. APPROACH is pleased to publish the following information, the first in a series by contractors on particular models, by Mr. L. J. LaVassar, Manager of Flight Test, Vertol Division, The Boeing Company.

I FEEL that the term "autorotation" has, throughout the years, adopted a connotation interpreted by most pilots as the capability of a helicopter to perform a full power-off landing. Therefore, I prefer the term "transition from power-on to power-off flight" when discussing the general characteristics of Vertol aircraft under this environment rather than entry into autorotation.

The technique concerning transition characteristics will vary with the degree of urgency. We prefer to consider the maneuver as a normal transition from power-on to power-off or a transition precipitated by loss of engine power available.

The pilot may perform a transition from maximum power available to full power-off flight operation by reducing the collective pitch control from a trim condition to approximately a low limit stop. Since the free turbine engine will only develop power when there is a specific demand for power, the low blade pitch angles will provide power-off capability through the overruning clutches positioned on each engine shaft. This type of maneuver at the high end of the speed band may be utilized by the pilot to attain maximum descent rates and has been occasionally effectively programmed as an evasive maneuver.

At the low end of the speed band the collective control is utilized by the pilot to control the aircraft flight path. The transition from a power-on to power-off condition may be effectively utilized to either steepen or shallow the approach path to an intended touchdown point. During either of these two conditions the collective control may be reduced to the low limit stop without any significant coupling transients or degradation in stability and control.

A second consideration in the transition from power-on to power-off flight is associated with the urgency dictated by complete engine power failure. Since Vertol vehicles are twin engine equipped, with independent supporting systems for each engine, the possibility of a simultaneous powerplant failure, we believe, is quite remote. This opinion is given some validity when we consider our records in which we have identified five such incidents that have occurred during 291,732 flight hours flown in the CH-46 through the time period from 1963 to 1968.

Logic has dictated that the more probable circumstances during which the CH-46 pilot may be confronted with an emergency transition from power-on to power-off flight would be failure of the second engine while the pilot is attempting to reach a satisfactory landing site during single engine operation. In this condition the airspeed would be in the best one-engine-out cruise range between 65 and 80 kts. We believe under this environment the pilot would be normally alert to the possibility of failure of the remaining engine. Rotor decay when transitioning from power-on to power-off flight is a function of blade pitch angle. The aircraft would be operating in an environment where the normal rotor decay rate would permit more tolerable reaction time in the event his remaining engine failed. Under these flight conditions an abrupt downward displacement of the collective control precipitates no control coupling or undesirable aircraft response characteristics.

In the event the aircraft is being operated at high speeds, maximum performance climb or heavy weight at low speed, where there is a demand for high blade pitch angles, the rotor RPM falloff following complete failure of both powerplants would demand normal pilot recognition time to this situation. We have considered this variable in the event the pilot is confronted with this improbable contingency. During a simulation of this flight condition at 129 kts, the collective pitch control was maintained in a high trim condition for a period of at least one second following the simulated power loss. This was followed by a sudden downward displacement of the collective to about the detent position. Falloff in rotor RPM, which was initially fairly steep, shallowed significantly coincidental with the initial downward displacement of the collective control. There were no coupling effects or pitching transients induced by the loss of power or the subsequent pilot reaction. Yaw and roll controls were maintained within 10 percent of their initial trim condition. The pitch attitude developed a slight nose-down attitude change of approximately 2 degrees and was effectively controlled with about 1 inch of aft stick.

An abrupt downward displacement of the collective pitch control will permit the aircraft to develop acceleration values that are less than the normal lG. This could adversely influence the total control available if it were held for sustained periods. However, the transient nature of the maneuver through the reduced G environment is of short duration and usually imperceptible.

It is important that the pilot avoid rotor RPM drooping below our generator protective frequency cutout. These values are 84 percent with a 5 second time delay or on any occasion where the main rotor RPM is permitted to droop below 80 percent. Loss of both the generators will have an undesirable side effect in that the aircraft stability system will become inoperative.

Following the transition from power-on to power-off flight, care should be exercised by the pilot to monitor his rotor speed to preclude exceeding the maximum or minimum redline limits. When the rotor speed is progressing downward and in proximity to the low limit RPM, the primary cue to the pilot will be his RPM indicator and the collective trim position. Normally this will be substantially above the 3 degree detent. When the rotor RPM is progressing upward and in proximity to the maximum redline RPM limit a sustained buildup in cockpit vibration will be noted due to the sustained operation outside the vibration absorber tuning range. A secondary indication of high rotor speed perceptible to the pilot would be the proximity of the collective pitch position near the low limit stop.

The full power-off landing on the CH-46 aircraft is a maneuver that can be readily accomplished under the duress of an emergency, *but one that we do not support as a training maneuver in view of the remote possibility that a pilot will encounter this condition.* At the suggested approach speed of 60 kts with 100 percent rotor RPM a flare-out of the aircraft flight path is initially accomplished with aft stick at approximately 75 ft. In addition to the shallowing of the approach flight path, the stick flare will also increase rotor RPM providing an additional collective flare capability to cushion the vertical touchdown velocity.

It is not the intent of this article to describe in detail the characteristics of the CH-46 during all contingencies which may demand a pilot transition from power-on to power-off flight. The CH-46D Handbook describes the specific maneuvers in sufficient detail so as to preclude the operational pilot from encountering areas that have not been previously investigated.

MURPHY'S LAW*

TAF-9J Longitudinal Control Murphy

IN ORDER to perform routine maintenance on a TAF-9J oxygen system it was necessary to disconnect the longitudinal control cables at their quick-disconnect fittings. Following completion of repairs to the oxygen system, a third class metalsmith was detailed to reattach the disconnected cables, which he did. The job was neither inspected nor signed off by a quality assurance inspector as is normally done. It was late on a Friday afternoon and there was no qualified inspector readily available – almost all the squadron personnel had been secured for a previously-scheduled squadron function. The metalsmith completed his work, checked the control for freedom of movement and then secured from the aircraft.

The following Monday a flight student was assigned the aircraft. He conducted a complete exterior preflight inspection of the aircraft, climbed in, completed his prestart checks and started the engine. As he commenced the nose-down/nose-up flying tail check he disbelievingly noticed the flying tail position indicator to be indicating the opposite of the expected direction. As he pushed the stick forward, the indicator moved to a nose-up position; as he pulled the stick aft, the indicator moved nose-down. A troubleshooter was summoned and upon arrival he confirmed that the flying tail was moving opposite to the positioning of the stick. The student shut down, wrote up the discrepancy on the yellow sheet and got another aircraft.

The immediate reaction of the first class metalsmith, upon reading the student's yellow sheet downing gripe was to remark: "Here's another one of those erroneous gripes – it just can't happen that way." Upon inspection of the aircraft cable connections, however, it was readily apparent that the elevator *up* and *down* cables had been cross-connected!

There are two methods of determining that the TAF-9J elevator cables are correctly (or incorrectly) attached at the cable quick-disconnect fittings: The fairleads, through which the cables are routed, are identified with 3-in. diameter colored circles around the fairlead holes, with red signifying routing for the elevator *up* cable and yellow for the elevator *down* cable. The terminal ends of these cables are correspondingly painted red and yellow for 3 ins where the cable is joined by the quick-disconnect fitting, which is also painted accordingly. The second means of determining which cables are *up* and which are *down* is the type of ball-joint attached to the end of the cable where it joins the quick-disconnect. The red-coded *up* cables are fitted with *single-ball* connectors while the *down* cable fittings are of the *double-ball* type.

A properly attached elevator *down* cable will, therefore, have a yellow quick-disconnect fitting joining two yellow cable ends and the second ball of each double-ball fitting will be visible on each side of that quick-disconnect. Hooking up the cables on both sides of the aircraft incorrectly results in elevator/flying tail movement opposite to stick movement; the correct attachment of the cables on one side combined with incorrect attachment on the other side would have resulted in a "locked" stick. The student's compliance with his poststart checklist fortunately thwarted this Murphy before it could result in damage or injury.

Contributed by G. Reith, Jr., ASO, VT-21

Our thanks to VT-21 for sharing the report of this Murphy with our readers. The value of completing all prescribed checklists is amply demonstrated. Had the student failed to complete the poststart checks it could have resulted in disaster. Hats off to this alert student.

* If an aircraft part can be installed incorrectly, someone will install it that way!

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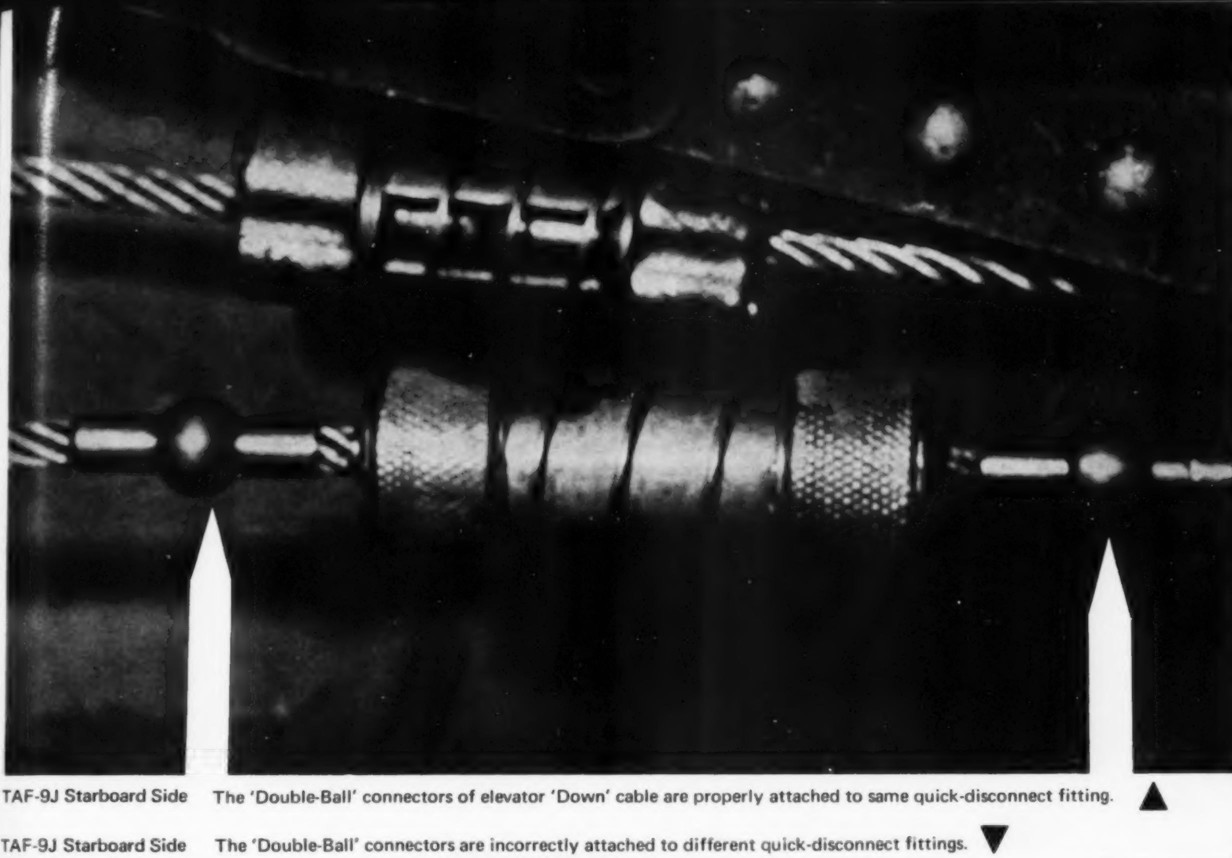
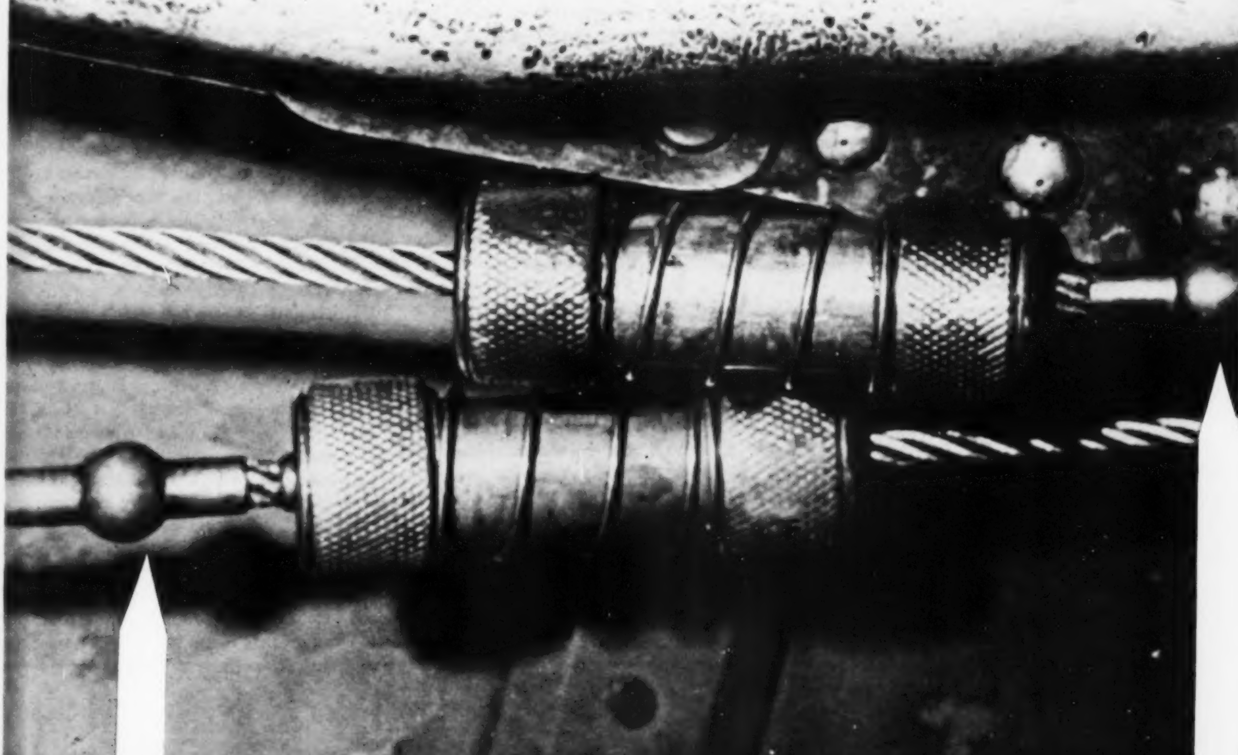


TAF-9J Starboard Side The 'Double-Ball' connectors of elevator 'Down' cable are properly attached to same quick-disconnect fitting. ▲

TAF-9J Starboard Side The 'Double-Ball' connectors are incorrectly attached to different quick-disconnect fittings. ▼



LETTERS

Is This True in Your Outfit?

At Sea – While passing beneath the wing of an A-7 on the hangar deck, and as I walked directly along side of the No. 1 pylon, the MBR ejector foot was inadvertently fired by mechs working on the aircraft.

The ejector foot missed my right side by no more than an inch and the heat from the explosion seared the right side of my head.

A personal inquiry as to how this can happen in this outfit revealed that the majority of these people do not know that explosive charges are used for weapon ejection. The only precaution exercised around bomb racks is to avoid knocking their foreheads into them.

Education in proper maintenance and safety procedures around this type of equipment appears to be in order for this group of people.

I wonder if similar situations exist in other outfits?

ABQ2

• Judging from the number of inadvertent triggering of ordnance and associated equipment the lack of knowledge concerning ordnance appears to be commonplace in many outfits. What is often attributed to stray voltage is suspected to be stray people – that is, straying from proper procedures.

Education and training in the hazards of ordnance should be made available to all hands having access to an aircraft.

'Now Hear This and Eye, Eye Sir!'

FPO, New York – The April issue contained an informative article entitled "A Real Approach to FOD Prevention" written by two NASCRePac Field Service Representatives. I found the picture on page 37 which depicted an F-8 at 100 percent power especially interesting. It was pointed out to me by some alert petty officers in our Power Plants Division that it appears from the picture that the man holding the sign near the intake, and the editors, might also have thought about "A Real Approach to Ear and Eye Protection" before showing the world this picture.

I'm not too sure about the J57, but I know our little T58s can do some real damage!

We would like to offer the following adage to parallel that of the authors (which we enjoyed):

"Feed not into eyes and ears, items which are difficult to convert into sight and sound."

LT R. T. Ribolla
ASO, HC-4

• Sound advice, to coin a phrase! Co-author Bill Strong (in the photo) assured us he was wearing ear plugs and John B. Crocker, who was cropped out of the picutre, was wearing visible Mickey Mouse ear protectors – however, both devices are invisible in this photo. Rest assured that these experts, along with your well-trained POs have great respect for hearing protection devices.

Direction Finding

Wiltshire, England – I have been an avid reader of your publication and of *Naval Aviation News* for some years. Recently I graduated with Class 50 from the Naval Test Pilot School, Patuxent River, so I have a limited experience of your operating methods. In a number of accident briefs one continually meets the situation where the pilot of a single seat airplane has experienced an electrical failure or lost IFF and tacan and ends up losing his airplane due to lack of help from ground radar facilities. This points to the need to reinstate VHF/UHF DF facilities where they belong – alongside the radar controllers on the frequency in use, as an aid to identifying and possibly homing a lost airplane. DF equipment is relatively cheap, reliable and easily maintained – apart from the fact that most airfields already have it installed but located in the Tower where it cannot be used to best advantage. Agreed DF is old fashioned and second best after tacan/IFF/ADF but if its use can save even one pilot and airplane a year it will be more than cost effective.

LCDR A. L. Tarver
Royal Navy
Royal Navy Test Squadron
Salisbury
Wiltshire, England

• Thank you for your letter. It is a pleasure to hear from a member of our English counterpart, the Royal Navy. Your genuine interest is apparent and illustrates quite clearly that the subject of flight safety knows no boundaries.

At the present time there are 109 DF stations located in FAA Towers and 136 DF stations located in FAA Flight Service Stations in the United States. There are no DF stations located at controller stations in Air Route Traffic Control Centers. Having stated these figures, we now comment on your suggestion that DF stations would be better located (and of more value) if they were located at the Center controller's station in conjunction with his radar equipment rather than in Towers and Flight Service Stations.

Your letter contemplates a situation where a DF fix would be required (or desired) in order that a Center controller could better be able to acquire radar contact and provide radar control to an aircraft in an emergency situation. Your concern seems to be that since the Center has no DF equipment, the aircraft might be denied the valuable assistance of a DF fix as an aid to radar acquisition. This does not appear to be a particularly valid concern because even though the Center controller does not have DF equipment located at his station, *he does have a DF capability.* During CY 1968, in fact, Center controllers provided 32 DF assists to aircraft in distress. How is this possible?

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

It is because of the existence of a very effective system of communications which allows the Center controller to secure aircraft position information from other personnel using DF equipment located in nearby towers and flight service stations. Moreover, in the case of DF fixing by net, there must be a net control and the Center controller is often in the position of providing this function even though the initial DF request may have been directed to a Tower or Flight Service Station.

Finally, even if one argues that DF equipment should be located at the agency which provides the DF service, statistics indicate that our DF equipment is presently well-located, – i.e. during CY 1968, FAA Towers provided 477 DF assists and FAA Flight Service Stations provided 1251 assists. compared to the 32 assists by the Centers.

Seat Retention

FPO San Francisco – As all H-46 drivers know, if they are involved in an aircraft accident of any magnitude, their chance of survival is almost nil.

Why? Seat retention! The builders have come up with a 20G seat, an armored seat, a positive locking for the seat in the full forward position and last but not least, a seat retention kit.

All of these changes and no one has hit the nitty gritty of seat retention yet. We still have the weak link in the chain. The seat runners.

Why, with the pedal adjustment the aircraft has, does the seat have to move fore and aft? Why not a seat with vertical or slightly canted runners with 40G capabilities or even a stationary seat?

There has been much lip service to this effect but very few UR's submitted and little or no message traffic.

Maybe if someone reads this, our operating activities may get on the ball and do something about it.

1/LT Richard K. Kemerley,USMC

• Since the original contract Boeing Vertol has twice modified the CH-46 seat. AFC 109 was the first change which gave the seat the following G capability – 20G down, 20G longitudinal and 10G lateral. When the CH-46 arrived in Vietnam several hundred pounds of armor was added. The additional weight reduced the ability of the seat to withstand G forces to half the values shown above or less; this started a rash of seat separations. A field representative and H&MS 16 personnel came up with a field fix for WestPac CH-46s to eliminate the weak point in the seat structure and this should have been installed locally last summer.

No revised G load figures are available since this fix was created and incorporated in the field. This field fix was revised, refined and issued as Interim Airframe Change 259. The seat assembly (where the cracked welds occured) was successfully tested with Interim Airframe Change 259 installed to 109 percent of its lateral design load.

NavAirSysCom recently issued Airframe Change 237, to be incorporated during modification, which strengthens the longitudinal seat retention.

The reason for having a movable seat is found in the design requirements. Aircraft now in the fleet were designed to meet the physical size criteria of the 5 to 95 percentile range of all naval aviators. Taking the 5 to 95 percentile functional reach range of 29.3 inches to 34 inches as an example of the requirements to be met, one can see that the seat movement allows the different size pilots to attain the greatest degree of comfort as well as reach the instrument panel, etc. This same generalization holds true for torso length, back to knee length and heel to knee lengths.

Additionally, the design of the rudder pedals is such that when they are placed in the full up (short legs) position full throw cannot be attained due to interference from the instrument panel.

We agree that the seat runners are the most suspect weak link remaining in the seat retention problem. Consequently, NavSafeCen has recommended to NavAirSysCom that pilot seats in the H-46 be modified to withstand increased lateral forces. Additionally, we have forwarded a copy of your letter to assist in focusing attention on strengthening the seat runners as a cure to the problem.

Thank you for your interest and your suggestion for a solution in this problem area.

Vol. 15 **approach** No. 2

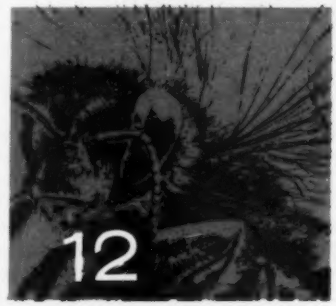
RADM Roger W. Mehle

Commander, Naval Safety Center

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

CONTENTS

DEPARTMENTS



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Next Month

Cockpit Distractions

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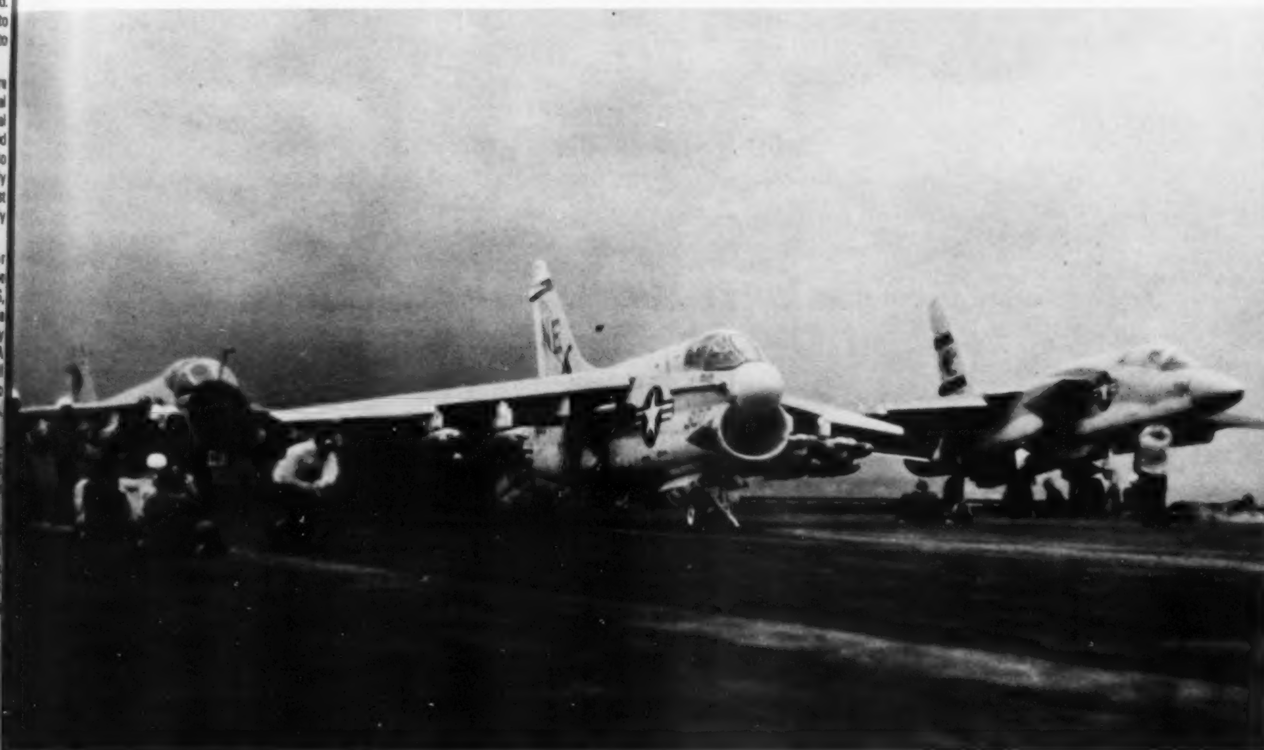
Blake Rader, Illustrator
PHC Harry Culbertson, Photographer
K. E. Warmack, Editorial Assistant

Credits This month's cover by Ron Ferguson shows the new OV-10A mounting an attack in the skies over Vietnam. Courtesy North American Rockwell (Columbus Division). **Pg 35** B.C. by Johnny Hart courtesy Johnny Hart and Field Enterprises, Inc.

U. S. NAVAL SAFETY CENTER

SAFETY AND READINESS



Some think that readiness is hindered by safety and that we are ready in spite of safety. Readiness and safety are as closely interrelated as pilot and LSO. Readiness cannot be maintained with numerous aircraft and crew losses, nor can readiness be maintained by tying down all aircraft and not flying them, although the safety record would be untarnished. Readiness can only be maintained through exposure to the hazards of operating. If we are to operate, then we must operate in the safest way possible. There is no such thing as a balance between readiness and safety because a balance indicates that if you add to one you upset the balance. Safety and readiness are like siamese twins in their total dependence on each other. — Commanding Officer, F. D. ROOSEVELT

LIFT and DRAG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NAVY